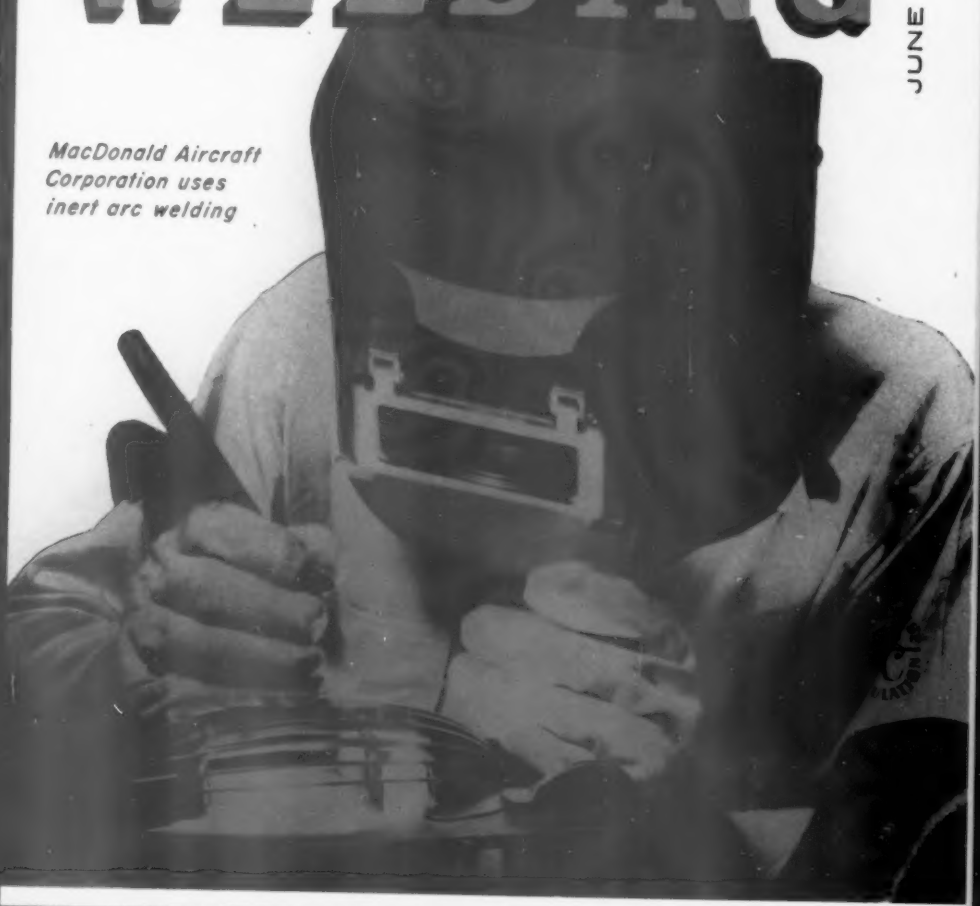
INDUSTRY & WELDING

JUNE 1956

MacDonald Aircraft Corporation uses inert arc welding



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SUPERGOGGLES by Jackson

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They're *wider* to allow plenty of inside room for good fit and free up and down movement where today's larger (never wider than $5\frac{11}{16}$") prescription and safety spectacles are worn.

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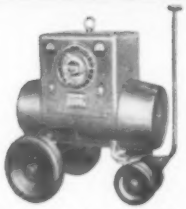

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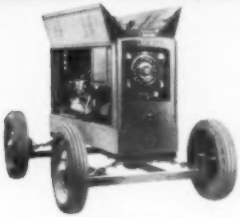
D.C. Rectifier



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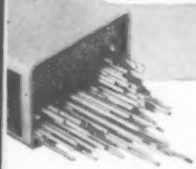

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Industry & Welding

JUNE, 1956

VOL. 29 NO. 6

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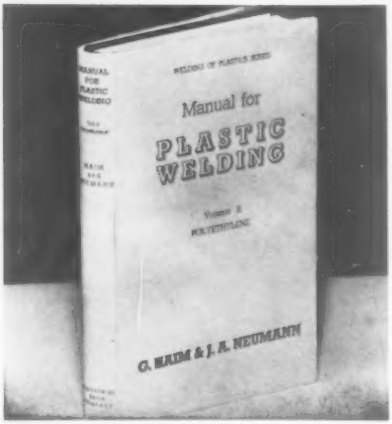

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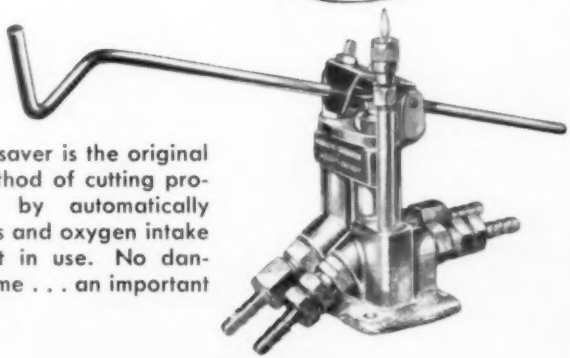

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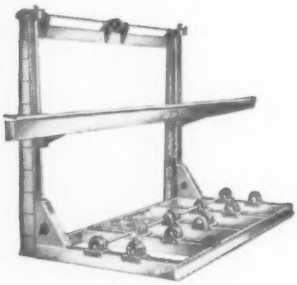

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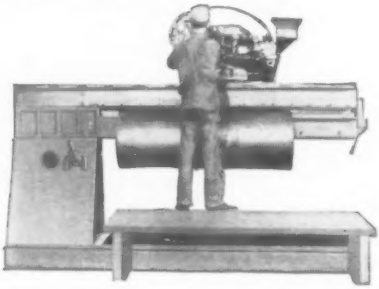

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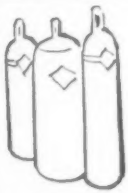

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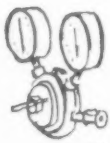

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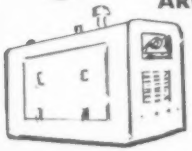

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LETTERS TO THE EDITOR

In the Spirit of Cooperation

Dear Sirs:

I would appreciate it if you would send product information to my home address. Though I work for the Detroit office of International Conveyor & Washer Corp., I actually put in very little time in the Detroit area.

My job includes purchasing of materials, erection design, fabricating of steel and actual installation. I obtained my copy of your magazine from Jackson Welding Supply Co., Rochester, N.Y., while I was in charge of an overhead conveyor installation at Rochester Products.

John J. Knoch

Not normal procedure, but under the circumstances we're glad to cooperate with a faithful reader.

We Liked This Letter

Gentlemen:

The March, 1956, issue of *INDUSTRY & WELDING* has just come to my desk.

I read with a great deal of interest the publicity which you have given our National Convention in this issue. You certainly have given us plenty of space. I assure you that your cooperation is sincerely appreciated.

E. C. Caluwaert, Past President
National Welding Supply Association

We're glad to be able to publicize the worthwhile activities of the National Welding Supply Association.

(Turn to Page 12)

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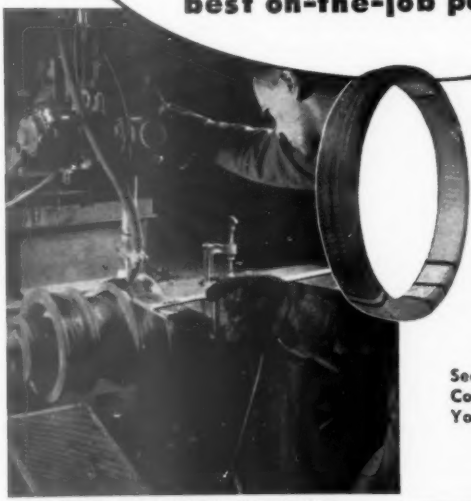

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LETTERS TO THE EDITOR

(Continued from Page 10)

An Interesting Subject

Dear Sir:

I am interested in obtaining additional descriptive literature pertaining to ultrasonic soldering.

George McCulloch, Dept. 494
Chrysler Corporation

This letter was just one of many which we received immediately after publication of the article, "Ultrasonic Soldering", in our December, 1955, issue.

More on Resistance Welding

Gentlemen:

In the December issue of *INDUSTRY & WELDING* you used a story on the Hamilton Watch Company. Would it be possible for us to have glossy prints of the photos appearing on pages 80 and 81 in conjunction with this story?

Charles Probert, Supervisor,
Sales Promotion
Taylor-Winfield Corporation

Photographs have been sent.

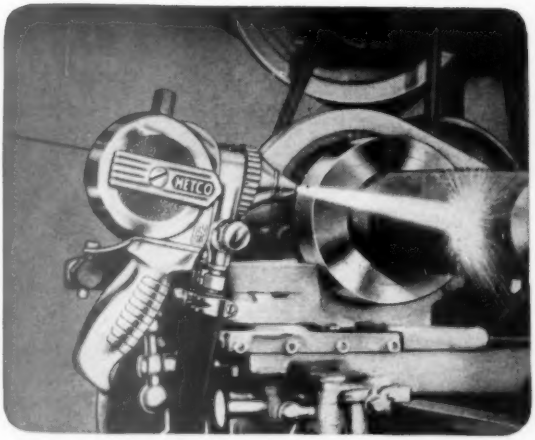
Stainless Steel Welding

Gentlemen:

Please send us tear sheet of the article entitled, "Your Stainless Welds — Are They Corrosion-Resistant? Leak-Tight?" by A. Grodner. This article was published in your September, 1955, issue on pages 52-54, 98-99.

E. C. Wallace, Metallurgist
Barber-Colman Company

This is typical of the many letters we received on this interesting article.



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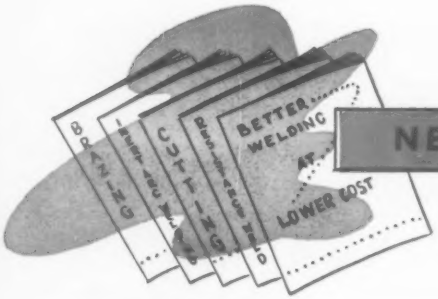


NEW REFERENCE DATA

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use postcard bound into this issue.

IF YOU HAVE A TORCH IN YOUR PLANT you will want a copy of a silver brazing data book published by Goldsmith Bros. Smelting & Refining Co. It gives complete information on silver brazing techniques and describes company's complete line of silver brazing alloys and fluxes. **Circle No. 35 on Reader Service Card.**

CIRCUMFERENTIAL AND LONGITUDINAL WELDING FIXTURES incorporating a high degree of automation are featured in the latest bulletin to be released by Airline Welding and Engineering. Includes description of new weld planishing roll. **Circle No. 100 on Reader Service Card.**

IMPACT AND CORROSION RESISTANT STEEL PLATE, SHAPES AND FORMS are featured in literature from Allied Steel & Tractor Products, Inc. Characteristics are given and welding techniques are suggested. **Circle No. 6 on Reader Service Card.**

IRON CONTENT OF STAINLESS STEEL WELDS is easily measured with a new instrument introduced by Ferro Corp. Precision instrument is said to replace destructive laboratory analysis and make possible rapid, on-the-spot, non-destructive tests for iron content at various points along a weld. **Circle No. 32 on Reader Service Card.**

MILD STEEL ELECTRODE CATALOG turned out by A. O. Smith Corp., contains much useful information about each of the classifications which it manufactures. Descriptions and procedures are concise and authoritative. Applications are also given. **Circle No. 103.**

SHEARING AND FORMING MACHINES, versatile enough to cut circles, straight edges, irregular shapes, and bead, fold, dish and cut louvers . . . are shown in American Pullmax Company's latest bulletin, No. 8-55-2.5. **Circle No. 104 on Reader Service Card.**

D-C TYPE ARC WELDING MACHINES are described in a new bulletin prepared by Westinghouse Electric Corp. Such information as how they are manufactured and how they can best be utilized in industry is effectively shown. **Circle No. 98 on Reader Service Card.**

FOURTEEN SET-UPS—ONE MACHINE. With the resistance welding machine described in brochure No. 563, the Taylor-Winfield Corporation claim that an operator is enabled to make rapid die changes, so important in high production work. **Circle No. 106 on Reader Service Card.**

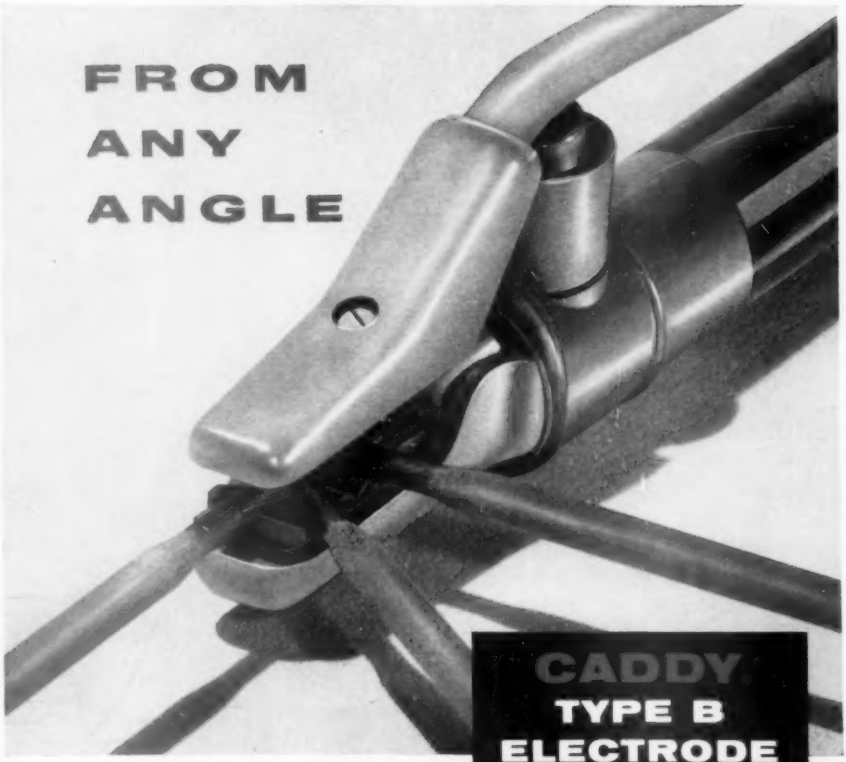
TUBE AND PIPE NOTCHING TOOLS AND CUT-OFF MACHINES are described in a folder from Vogel Tool & Die Corp. Notching tools are said to make perfect joints for welding or brazing, cut clean edges and eliminates any need for further finishing. **Circle No. 89.**

COMBINATION HELMET-SAFETY CAP is featured in latest bulletin from Willson Products, Inc. Also described and illustrated is complete line of protective equipment for face, head and eyes. **Circle No. 108 on Card.**

RESISTANCE WELDING MATERIALS for every use are described in catalog offered by P. R. Mallory & Co., Inc. Described and illustrated is a complete line of straight and offset electrodes, holders, dies, forgings, castings and seam welding wheels. **Circle No. 57.**

Turn to Page 17 For More Useful Literature.

BEST



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ARC WELDING ACCESSORY DIV.

Erico Products, Inc.

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Circle No. 30 on Reader Service Card.

EVEN THIS "BRUTE" IS IN WW STOCK!

If you're working in stainless steel, such as on aircraft, bus, trailer or modern railroad car construction, you're face to face with the problems of tremendous tip pressure. One of your answers is this WW 8 Degree Taper Holder, designed for up to 6,000 lbs., meeting the specifications of the leading builders of heavy duty welders. Another answer is the ready stock of these giants at WW Alloys. No more waiting for weeks for an untried "special"; this holder is in regular production. Write for specifications, or send information on your equipment for shipment same day.

Remember WW for every resistance welding need—electrodes, cold formed offset tips, holders, seam welding wheels, high conductivity castings, forgings, rod and bar stock. Ask for our catalog and name of distributor in your area.

WW ALLOYS, INC.

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DETROIT 4, MICHIGAN

Division of Fansteel Metallurgical Corporation

Circle No. 91 on Reader Service Card.

COOL AND SAFE ON THE HOTTEST, TOUGHEST CUTTING JOBS is the way Victor Equipment Co. describes its cutting torches and attachments. Brochure explains rugged construction details, including stainless steel head and tube assemblies. **Circle No. 109 on Reader Service Card.**

LAYER WOUND WIRE FOR INERT GAS SHIELDED ARC WELDING is described by the Reid-Avery Company, Inc., in a brochure which the company has prepared. Specifications are given for steel and alloy steel, non-ferrous and alloy and aluminum wire. **Circle No. 110 on Card.**

CONSTANT VOLTAGE WELDERS and how they can save you money is the story told in brochure from Harnischfeger Corp. How welders save installation and wire costs and cut power consumption is explained. **Circle No. 37 on Reader Service Card.**

HOW TO SPEED UP SPOT WELDING OPERATIONS is explained in literature from SMS Corp. Described in detail are company's adjustable adapters and pressure holders which permit changing from one electrode spacing to another in a matter of a few minutes with same setup. **Circle No. 74 on Reader Service Card.**

SPATTER-REPELLING COVER LENSES, manufactured by Hordis Brothers, and said to be pit-proof, spatter proof, and constantly clear, are described in a multi color brochure. Lenses can be made available to welding supply distributors in individually wrapped envelopes imprinted with distributors' names. **Circle No. 43 on Reader Service Card.**

RESISTANCE WELDING ELECTRODES, WHEELS AND HOLDERS are featured in a bound volume from Tipaloy, Inc. Material covers established standards, glossary of resistance welding terms, comparison chart and resistance welding materials made by the company. **Circle No. 83.**

SEVEN-INCH STANDARD GRINDER AND SANDER and how its important design features increase weld grinding efficiency is explained in bulletin from Black & Decker Mfg. Co. Electric motor is given complete coverage. **Circle No. 18 on Reader Service Card.**

PRECISION ARC AND SPOT WELDERS are subject of a complete catalog from Birdsell Products. Catalog explains in detail how units furnish power when and where it is needed and in exact amount required. **Circle No. 17 on Reader Service Card.**

USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

A POWER OPERATED SAW WHICH CUTS IN ANY POSITION is featured in literature from Wallace Supplies Mfg. Co. Handy unit is lightweight and low cost, according to manufacturer. **Circle No. 93 on Reader Service Card.**

STAINLESS STEEL AUTOMATIC WELDING WIRE for every application is featured in catalog from Crucible Steel Co. of America. Complete information is included for easy ordering of wide range of wire sizes and analyses. **Circle No. 25 on Reader Service Card.**

A PIPE SHOP IN ITSELF is the way Vernon Tool Co., Ltd., describes its pipe cutting pantograph in Bulletin P-10. Complete operating instructions and design details are given for one-operator unit which can make beveled cut-offs quickly and easily. **Circle No. 153 on Reader Service Card.**

WELDING FUME EXHAUST SYSTEMS, including blowers and exhausters, are described in Engwald Corporation's latest catalog. Portable and ceiling mounted units are shown in typical welding shop layouts. **Circle No. 117.**

BRAZING AND SOLDERING FIXTURE is described in Engineering Bulletin 101, just issued by Technion Design & Mfg. Co. It can be mounted on a bench vise, and turns through 360 degrees. Ease of set-up is emphasized. **Circle No. 118 on Reader Service Card.**

Turn to Page 18

FABRICATORS OF CHEMICAL PROCESS EQUIPMENT, the Colonial Iron Works Company has outlined the standard and custom work for which they are best known in their latest catalog No. C-56. Includes tanks, pressure vessels, heat exchangers. **Circle No. 119 on Reader Service Card.**

EUROPEAN TECHNICAL DIGESTS: The best articles from European technical and industrial journals, translated and digested, are available through the Office of Technical Services, U. S. Dept. of Commerce. Designed for concise, easy reading, the monthly periodical averages 140 illustrated pages. Periodical is available at nominal cost. **Circle No. 120 on Reader Card.**

WELDING ACCESSORIES, INCLUDING WELDING HELMETS, ELECTRODE HOLDERS, welding cable, chipping hammers, wire brushes, are shown in The Fibre-Metal Products Company's latest 48-page comprehensive catalog No. 24. **Circle No. 121 on Reader Service Card.**

PLANTS FOR PRODUCTION OF OXYGEN OR NITROGEN are described in a catalog just issued by Superior Air Products Co. Liquid air and acetylene plants are also described. Production data and flow diagrams are included. **Circle No. 122 on Reader Service Card.**

AIR COMPRESSORS FROM 1/3 TO 20 H.P., single and two-stage, gasoline and electric motor driven, are described by the manufacturer, the American Brake Shoe Company. Booklet includes information on how to select the correct capacity of compressor. **Circle No. 123 on Reader Service Card.**

STEEL FLANGES AND WELDING FITTINGS for low-temperature, room-temperature, and high temperature service are listed in a cloth-bound catalog prepared by Alco Products, Incorporated. Book briefly describes Alco production methods, but gives a detailed description of each of the products. **Circle No. 124 on Reader Service Card.**

Turn to Page 20

the **ARC-TWIN** *Cuts Two Perfect Notches*

in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅛" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

PATENTED

Ask for twin-notched sample of pipe or tubing

VOGEL TOOL AND DIE CORPORATION 1819 North 32nd Ave. Melrose Park, Illinois

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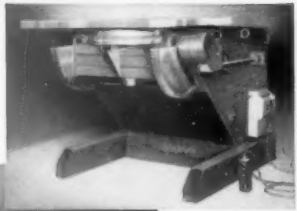
Aronson

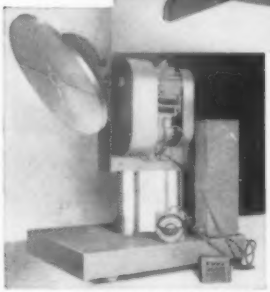
Offers You Over 200 PROVEN Standard Stock Models of Quality POSITIONERS "POSITIONEERED" to your exact Requirements

Patented

Aronson TracTred (T. M. Reg.) Turning Rolls for thin-walled heavy cylindrical work to 27 tons capacity. Zero to 100 IPM turning speed and Built-In Grounding.

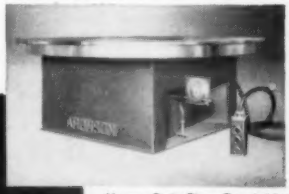


Heavy Duty Precision Built Rubber and Steel Tired Turning Rolls, 100% overload protected. Capacities to 250 Tons. Also Tilting Rolls, Pipe Rolls and Rail Cars.

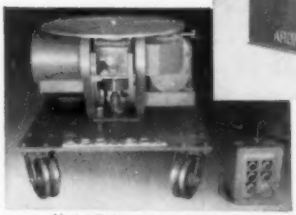


Fully Automatic Gear Driven Positioners, featuring Power Elevation, Tilting and Rotation. 5,000 lbs. Capacity.

Heavy Duty Gear Driven Positioners, with Magnetic Braking, Mercury Grounding, and Optional Speeds. Capacities to 24,000 lbs.



Heavy Duty Floor Turntables with precision speed control and Magnetic Braking, used for welding, burning, X-raying, etc. Capacities to 75,000 lbs., various heights and speeds.

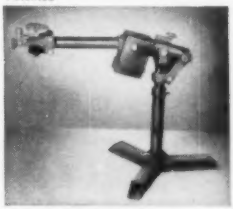


Model D Gear Driven Positioners, Compact, Precise, Rugged. Capacities to 1000 lbs.

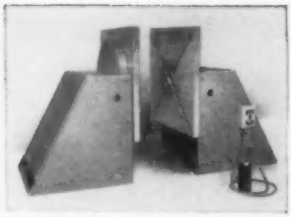
Bench Turntable Automatic Positioners with Mercury Grounding Capacities to 500 lbs.

Aronson Twinner Permanent Magnetic Clamps, six models with thousands of uses in welding set-up work. Write for bulletin.

Patented



Aronson Universal Balance Positioners (T. M. Reg.) position your weldments effectively, instantly for downhand welding. Capacities to 2000 lbs.



Rugged Head and Tail Stock for positioning bulky weldments between centers. Table Backup for Zero Deflection. Magnetic Braking. Capacities to 160,000 lbs.

Quality PRODUCTS by Aronson MACHINE COMPANY
ARCADE, NEW YORK

Circle No. 15 on Reader Service Card.

New Reference Data

from page 18

TECHNICAL DATA CHART 155A, prepared by the Babcock & Wilcox Company, summarizes the various recommendations for joining, by arc welding, various tubing steels. Also provides information on preheating and post-welding heat treatments. **Circle No. 125 on Reader Service Card.**

WROUGHT IRON FITTINGS AND FLANGES are described in a new folder just published by Tube Turns, a division of National Cylinder Gas Co. Folder gives dimensional data, discusses physical properties, and illustrates typical applications. **Circle No. 126 on Service Card.**

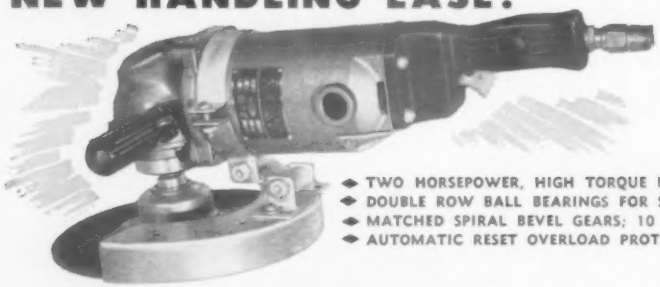
FULL RANGE OF SPECIAL RESISTANCE WELDERS AND SPECIAL ARC WELDERS for automatic applications are described by Acro Welder Mfg. Co., in 12-page Bulletin No. 156. **Circle No. 127 on Reader Service Card.**

HIGH SPEED, LOW-COST HARDFACING is explained in Bulletin 126 from Metallizing Engineering Co., Inc. Introduced is new ThermoSpray process which can be used to apply powdered metals and ceramics without compressed air. Featured are six different self-fluxing nickel-chromium-boron alloys which can be torch-fused, semi-fused or unfused to meet varying service requirements. **Circle No. 59 on Reader Service Card.**

"THE FACTS OF LIFE" on ignitrons for control of resistance welding operations are explained in interesting, colorful brochure from Amperex Electronic Corp. Brochure gives full story on cost and service life of company's regular and temperature-controlled ignitron types. **Circle No. 128.**

Turn to Page 22

NEW DESIGN, NEW POWER (2 H.P.), NEW HANDLING EASE!



- TWO HORSEPOWER, HIGH TORQUE MOTOR
- DOUBLE ROW BALL BEARINGS FOR SPINDLE THRUST
- MATCHED SPIRAL BEVEL GEARS; 10 H.P. RATED
- AUTOMATIC RESET OVERLOAD PROTECTION SWITCH

Here's brand new portable grinding power! A full two-horsepower motor specially designed into a rugged, precision-made, easy-to-handle chassis. This means faster, more profitable grinding.

Extremely large cooling fan and vent areas assure cooler motor operation. Extra heavy duty pre-loaded double-row ball bearings take the spindle thrust. This means extra long grinder life. This grinder has a normal operation at 60% of available horsepower. It weighs only 14 pounds (net) . . . 25% less weight per horsepower.

Investigate the many advantages of this unique grinder. Sold through welding supply distributors.

J & H PRODUCTS COMPANY

DALLAS J&H PRODUCTS CO. TEXAS

3007 Elm Street, Dallas 26, Texas • 50 Milk Street, Westboro, Mass. 210 W. 14th Street, Los Angeles 15, Cal.

Circle No. 48 on Reader Service Card.

Circle No. 16 on Reader Service Card.

WELDING POSITIONERS: In a recent bulletin No. P-23, the Harnischfeger Corporation describe some of the safety features incorporated in their tilting mechanism. **Circle No. 101.**

WRENCHES FOR ACETYLENE WELDING, including a description of an assortment of wrenches for acetylene tanks, are described in an illustrated bulletin prepared by The Chicago Hardware Foundry Co. Bulletin 608 contains cost data. **Circle No. 129 on Reader Service Card.**

QUICK DISCONNECT ELECTRODE HOLDERS are described in Bulletin 131, prepared by Industriline Incorporated. Bulletin includes sketches, drawings and photographs and other specification data. **Circle No. 130 on Reader Service Card.**

"RESISTANCE WELDING IN AIRCRAFT INDUSTRY" is the topic of a recent issue of "Tips and Dies," the house organ of Federal Machine and Welder Company. Shows automatic flash welder, roll spot welders and seam welders in action. **Circle No. 131 on Reader Service Card.**

REPAIR OF CAST IRON PARTS is described in a new, illustrated booklet recently issued by the International Nickel Company, Inc. Outlines nine graphic cases relating to the welding of cast iron. **Circle No. 132 on Reader Service Card.**

POWDERED METALS AND CERAMICS CAN BE SPRAYED WITHOUT COMPRESSED AIR if you use the new ThermoSpray Type P gun introduced by Metallizing Engineering Co., Inc. Bulletin 125 gives complete operating instructions and design details of new gun. Complete list of accessories is given. **Circle No. 59 on Reader Service Card.**

Protect Weld Rods The "DRY-ROD"® Way

Your cheapest insurance against wasteful, defective welds is Dry-Rod. Protects low-hydrogen, austinetic, other special alloy electrodes, and the new iron powder contact rods, against moisture.

DryRod promotes steadier welding with less slowdown — reworks — scrap. Pays for itself out of rod salvage alone. Less than 15c per 24-hour operating cost.

Completely wired, ready for use. Automatically controlled temperatures adjust from 175° to 550°. F. for storage or rebaking.

Two sizes available. 10 lb. capacity Portable unit. Popular Type 300 Model with 350 lb. capacity (shown below.) Quickly converts for preheating, drying, tempering, drawing of small die parts and other industrial uses.

For details, see your Welding Supply Dealer or write:

Dry® Rod ***Div. of Phoenix DR-23 Products Co.***

4715 N. 27th St., Milwaukee 9, Wis.

Circle No. 70 on Reader Service Card.

They've Caught on with
the Men Who Wear Them
— and the Men Who Buy Them!

Specially Tanned

AO "Drednaut" COWHIDE GLOVES

SC5X163 SC5X143

Protects on gas welding and heaviest amperage electric welding. One-piece back and palm. Welted where necessary.

Gunn cut one-piece back reduces number of seams to minimum. Lined on back of hand from wrist to finger tips.

Also ask about our SCTX100,SCTX200 and SC3013 Gloves — sure to please every preference.

Welders who wear them like the comfort of AO Drednauts — even after long exposure to heat, they help reduce hand fatigue because they're soft and flexible.

Safety Directors who buy them like the way the leather resists abrasion for longer life. Lab and field tests show that this leather outlasts all others on wear, with practically no shrinkage on exposure up to 350° for 90 minutes.

Your nearest AO Safety Products Representative can supply you.

Quick Facts

- As *flexible* as horsehide
- As *strong* as horsehide (tensile strength)
- As *heat resistant* as horsehide
- More abrasion-resistant than horsehide

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Circle No. 10 on Reader Service Card.

THE BFR WHEEL is outstanding for light weld grinding, blending contours and corners, removing rust and scale, scarfing and beveling before welding. This soft-action, semi-flexible hub-type wheel has cotton fabric reinforcement with additional layer of Nylon.

THE BD WHEEL is ideal for heavier weld grinding jobs, smoothing flame-cut edges and stainless steel welds, many slotting, notching and cutting-off operations and removing light fins from castings. Glass cloth plus Nylon is the reinforcement in this rigid hub-type wheel.

Circle No. 69 on Reader Service Card.

LIGHT or HEAVY

Norton Reinforced Wheels bring the money-saving "TOUCH of GOLD" to countless weld grinding jobs

Two of the most popular Norton reinforced hub-type wheels — the semi-flexible BFR for light duty and the rigid BD for heavier work — make a team that can't be beaten for all-around usefulness. Separately, each handles a considerable number of grinding jobs. Together, they cover an almost endless list of applications, ranging from lightest scale removal to finishing heavy stainless steel welds. And they do every job with the extra safety, service life and economy that adds the profit-building "Touch of Gold" to your grinding operations.

Where regular type abrasive wheels are called for, remember that the Norton line is 100% complete, with shapes and sizes for every application. In particular, B-11 resinoid bonded wheels for your heavier jobs have the uniformity of structure and perfect balance that results in easier, faster, more profitable grinding.

See Your Norton Distributor or write the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N.Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1711

NORTON
ABRASIVES

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
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Making better products... to make your products better

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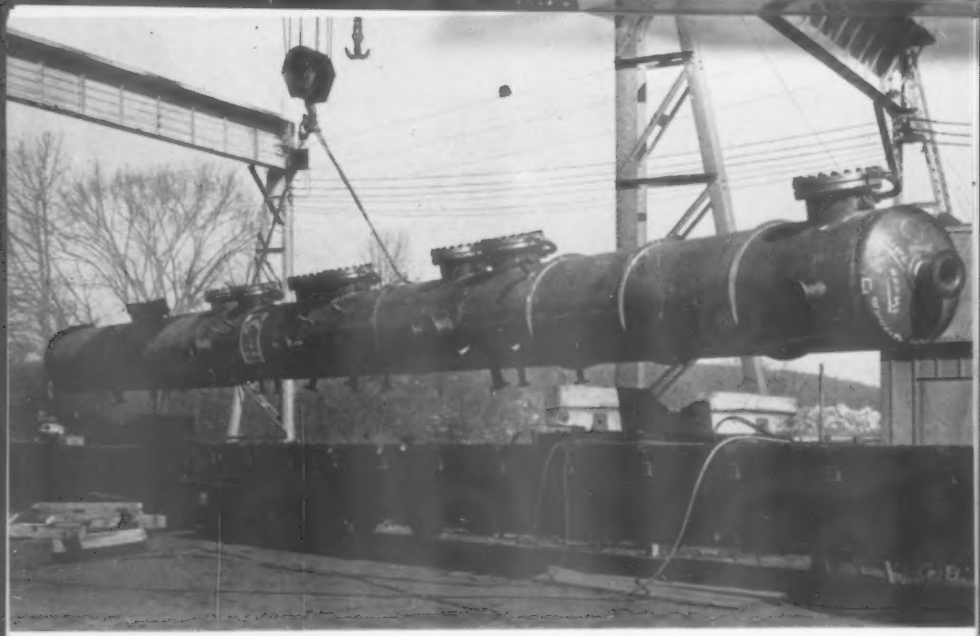


Welded with dependable

ARCALOY

STAINLESS STEEL ELECTRODES

Downingtown weldors found Arcaloy Type 310 AC-DC the ideal electrode for the many welds in this vessel. Shown above they are working on the final assembly welds between the 410 clad section and the mild steel section.

DOWNINGTOWN Iron Works, Inc.* used Arcaloy stainless steel electrodes in the fabrication of this 80′ refinery stripper tower. They chose Arcaloy Type 310 AC-DC electrodes for welding the 48″ diameter clad section and for joining it to the 42″ diameter steel section. Fabricated under API-ASME code, this vessel had to have welds of x-ray quality. The Downingtown staff knew that dependable Arcaloy stainless steel electrodes would produce these sound welds.

This stripper tower is typical of the fine products of Downingtown Iron, products that reflect the efficient planning, skilled workmanship and thorough service of this outstanding builder of equipment. Arcaloy stainless steel electrodes were *their* choice—and should be yours, too—for producing high quality weldments.

For complete information on dependable Arcaloy stainless steel electrodes, see your Alloy Rods distributor or write:

General Offices and Plant
Lincoln Highway West • YORK 1, PENNSYLVANIA

Pacific Coast Sales Office and Plant
750 Lairport Street • EL SEGUNDO, CALIFORNIA

Division of:
PRESSED STEEL TANK COMPANY,
Milwaukee 14, Wisconsin

Alloy Rods Co.

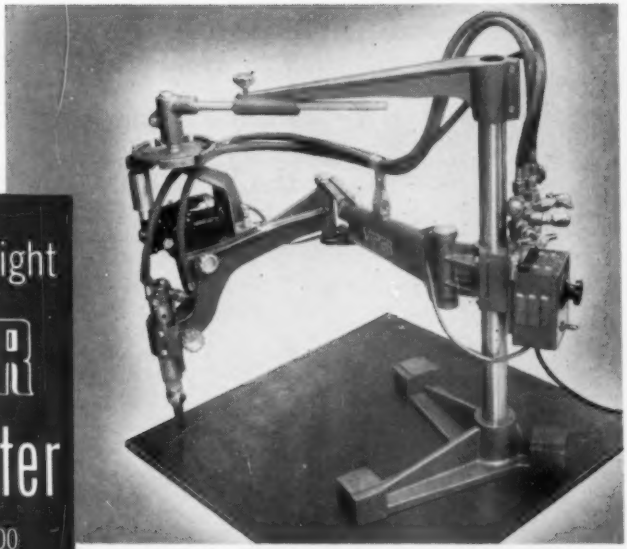
no finer electrodes made... anywhere

Circle No. 7 on Reader Service Card.

New, lightweight

VICTOR Duplicutter

MODEL DC-2000



Portable Model DC-2000 cuts circles to 19½" diameter, rectangles to 12" x 35", and metals to 8" thick. Torch accommodates all Victor 1-101 and 1-100 cutting tips, through size 5.

Flame cuts parts accurately, saves handling and set-up time, increases labor efficiency.

This portable VICTOR DUPLICUTTER weighs only 36 pounds. Operator easily carries it to any work location in plant, field or warehouse . . . thus saving you time and cost of moving materials. Set-up takes minutes only. You lose no time leveling DUPLICUTTER—its magnetized feet use stock being cut as working base. And it's so simple one man easily handles production from 2 or 3 DUPLICUTTERS.

Precise controls and powerful, permanent magnet in template follower enable you to duplicate parts to production tolerances of plus or minus 1/64". Easy, quick interchange of templates makes DUPLICUTTER practical for both long production runs or duplication of single part.

Why not see for yourself how easily the VICTOR DUPLICUTTER handles, how fast and accurately it cuts? Call your VICTOR dealer NOW and ask him for a demonstration on your job . . . or write us for descriptive Bulletin 353.

For maximum efficiency and safety, use genuine Victor tips and parts

VICTOR for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

844 Folsom St.
San Francisco 7

3821 Santa Fe Avenue
Los Angeles 58

30

Circle No. 88 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Progressive Promotes Two Top Executives

Ray W. Heiden has recently been appointed as director of manufacturing of Progressive Welder Sales Company, Detroit, Mich. Mr. Heiden has long been active in manufacturing management at Progressive and is considered one of the industry's authorities on manufacturing organization and methods.

HEIDEN

LOUP

At the same time, Ronald L. Loup was appointed director of engineering. Mr. Loup is well known throughout the industry for his ability in resistance welding equipment design.

Appointment of Interest at Metal & Thermit

Metal & Thermit Corporation has announced the appointment of Charles H. Carpenter, Jr., as assistant manager, Market Development Department, at the company's home offices in New York.

Carpenter, a chemical engineer, comes to Metal & Thermit from American Cyanamid Company, where he served as senior market analyst. Prior to that he held positions as chemical engineer, development engineer and group leader, at United States Steel.

Liquid Carbonic Promotes Mathey

H. C. Mathey has been promoted to vice president in charge of sales of the Liquid Carbonic Corporation. Mr. Mathey, a graduate of Lafayette College, has been with Liquid for thirty years. During that time he has had wide experience in the Company's compressed gas divisions.

Prior to assuming his new duties, Mr. Mathey was vice president in charge of the Pacific Coast operations.

Handy & Harman Elects Key Official

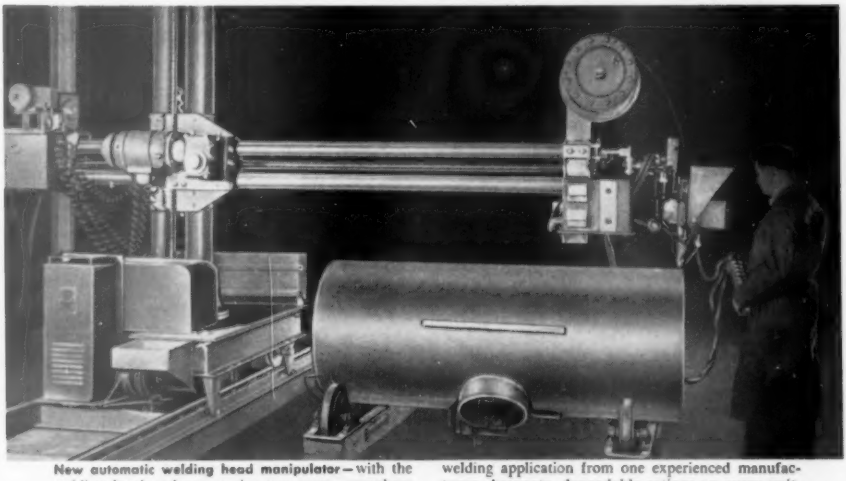
Francis H. Wemple, treasurer of the Company, was elected a director of Handy & Harman at the annual Shareholders Meeting, recently.

Mr. Wemple joined Handy & Harman, in 1945; he served as assistant secretary and was elected treasurer in 1954.

(More News on Page 30)

Automatic welding made easy!

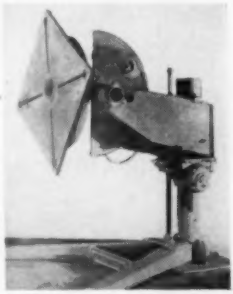
Now—only Worthington offers complete basic equipment line—plus nationwide sales and service



New automatic welding head manipulator—with the welding head and accessories you want—completes Worthington's welding equipment line. You can get all the basic equipment you need for every automatic welding application from one experienced manufacturer. Accurate, dependable ratings on every unit. Choose from the largest standard equipment line on the market.

Automatic turning rolls permit you to rotate cylindrical work for welding and assembly simply by pushing a button.

New power elevation is standard on four Worthington welding positioners. Now tilt, rotation and lift are all automatic. And at Worthington you get the equipment and service you need—when you need it.



Write for details to Worthington Corporation, Positioning Equipment Division, Section Y.6.2, Harrison, New Jersey.

Y.6.2

WORTHINGTON

Welding Positioners • Turning Rolls • Manipulators

Circle No. 152 on Reader Service Card.

Stewart Takes Over Welding Equipment Co.

Lowry L. Stewart has recently acquired control of welding Equipment Company, Oklahoma City, Oklahoma, according to a recent press notice. The Company, an old established one, specializes in the sale, rental and service of all forms of welding equipment. Mr. L. E. "Gillie" Gillihan, former partner in Yellow Welding Company, has been appointed store manager, and Russ Brown will handle City sales.

Thor Promotes Three Sales Managers

Three zone managers of Thor Power Tool Company, Aurora, Ill., have recently been appointed.

J. P. Stine, former electric tool service engineer, has been named east coast zone manager with headquarters in Newark.

C. B. Baron, former electric tool service engineer, and a former division manager, is the new west coast zone manager, with headquarters in Los Angeles.

R. J. Burch, former Birmingham electric tool service engineer, was appointed southeastern zone manager. He will make his headquarters in Birmingham.

(More News on Page 121)

Alloys and Fluxes for SOLDERING FILLING SEALING ARC WELDING TORCH WELDING FURNACE BRAZING TORCH BRAZING

SWITCHED TO A-S No. 13

Company Processing Sugar Beets

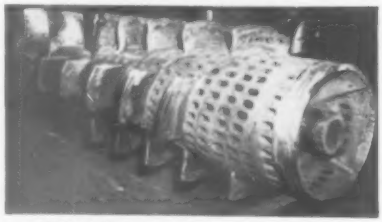
They Switched to Nickel-Silver for Retreading with Wear-Resisting Build-Up Metal!

They spent $23.74 **more** for 100 lb. of Nickel-Silver . . . **saved** $150.50 in other costs incident to repair of this one spindle. They repeated on 8 spindles. All-State No. 13 Nickel-Silver Build-Up Rod is now their standard for retreading.**

ALL-STATE No. 13 is Famous for Savings!

- **20 lb. saved replacement** of a **$1300.00** packing gland journal.
- **25 lb. saved $510.00** net on finely heat-treated gears.
- Hundreds other case histories of Savings.

10 lb. No. 13 will start saving money for you. Comes bare or flux-coated.



**Details on request

FREE ASK FOR BUYERS GUIDE. THIS IS A BOOK FULL OF PRODUCT SOLUTIONS TO METALWORKING PROBLEMS.

ALL-STATE WELDING ALLOYS CO., INC., WHITE PLAINS, N. Y.

Circle No. 8 on Reader Service Card.

FOR

LOW-COST PRODUCTION SOLDERING

Low-cost, basic outfit includes fully adjustable, pressure regulator and precision handle for complete flame control and gas economy.

Prest-O-Lite Trade-Mark Air-Acetylene Equipment

Whatever your soldering, heating, and brazing needs, there's a PREST-O-LITE outfit to meet your exact requirements. Because you "tailor-make" your own. You have:

YOUR CHOICE of standard torch handle or precision model with gas-saving shutoff valve and built-in pilot flame control. All stems fit interchangeably on either handle.

YOUR CHOICE of seven open flame stems in job-matched sizes for everything from heavy heating to fine electrical soldering; pointed or chisel type soldering iron stems for use where an open flame is not practical.

YOUR CHOICE of operating from small portable tanks, standard cylinders, or industrial piping systems.

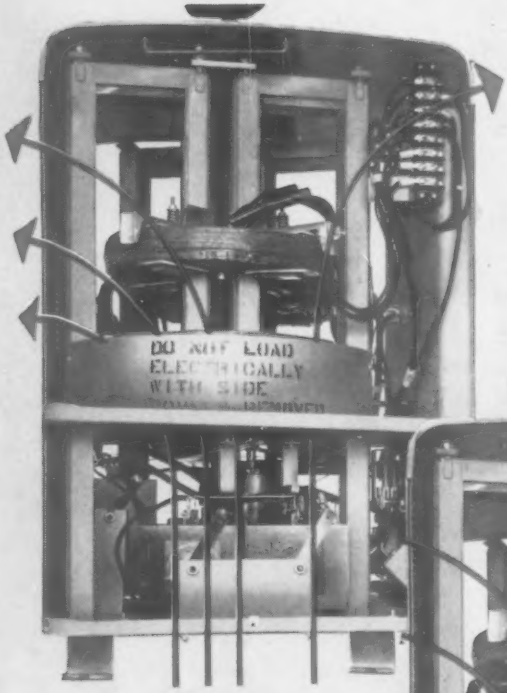
Ask your LINDE jobber for a demonstration. Or write LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. In Canada: Linde Air Products Company, Division of Union Carbide Canada Limited, Toronto.

Get it from your LINDE jobber

The terms "Linde" and "Prest-O-Lite" are registered trade-marks of Union Carbide and Carbon Corporation.

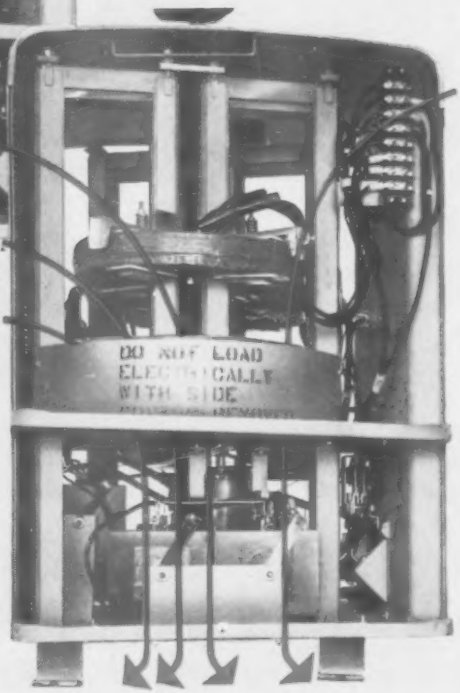
Circle No. 55 on Reader Service Card.

Another



SWITCH DOWN

With switch in normal down position fan draws cool air up through welder.



SWITCH UP

With switch up, air is blown down through rectifier fins to dislodge dust.

Circle No. 34 on Reader Service Card.

FOR ALL YOUR WELDING NEEDS

G.E. offers all three types of heavy-duty welders—AC Transformer, DC Rectifier, Motor-generator—plus a complete line of equipment, accessories, and electrodes.

AC Transformer

Motor-Generator

Engine Drive

General Electric Exclusive

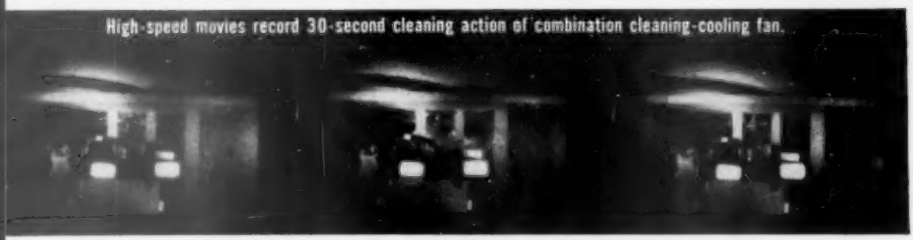
Reversible Fan Dusts Off Rectifier in Seconds; Gives G-E Rectifier Welders Up to 50% Longer Life

Available only with General Electric rectifier welders, the combination cleaning-cooling fan gives you up to 50% longer welder life! Here's why: This double-duty fan automatically cools the welder, continuously drawing cool air from floor level, up through the rectifier stacks, and over the coils. At the flick of a convenient switch, the fan reverses, blowing accumulated dust off the rectifier stacks. This cleaning action helps free the stacks of dust, which frequently blocks the air flow between the plates and causes burnouts.

Other exclusive features of this new line of G-E rectifier welders include:
FULL-TIME ARC-FORCE CONTROL, which eliminates electrode sticking.
EASILY REMOVABLE SIDE COVERS, which come off with removal of 3 screws.

These and other G-E engineered extras (see chart below) are all available only with G-E rectifier welders. Contact your local G-E Welding Distributor for a free demonstration (he's listed in the yellow pages of your phone book) or write for bulletin GEA-6242, Section 711-4E, General Electric Company, Schenectady 5, New York.

	Full-time arc-force control	Combination cleaning-cooling fan	Moving-coil design	Silicone insulation	Aluminum-wound coils	Removable side covers	Reversing-polarity switch	Large, logarithmic current scale
General Electric	✓	✓	✓	✓	✓	✓	✓	✓
Manufacturer A					✓			
Manufacturer B							✓	
Manufacturer C			✓					✓



High-speed movies record 30-second cleaning action of combination cleaning-cooling fan.

GENERAL ELECTRIC

DC Rectifier | Semi-automatic | Automatic | Electrodes | Accessories

MUREX® SPEEDEX HTS

TYPE E-7016

For all-position welding, of hard-to-weld steels

Low hydrogen—iron powder electrodes for low alloy, high tensile steels, MUREX SPEEDEX HTS electrodes deposit more pounds of weld metal per hour than conventional electrodes. They are preferred for a variety of hard-to-weld metals, where welding speed and strength are important and underbead cracking must be minimized or eliminated.

- SPEEDEX HTS gives a quiet, steady arc with good penetration.
- SPEEDEX HTS deposits are easily controlled . . . slag is light and friable.
- SPEEDEX HTS produces porosity-free welds that will readily pass radiographic inspection.

For further information on this or the complete line of Murex electrodes, machines and accessories, write or phone—there's an office near you.

WELDING SUPPLIES
RADIOGRAPHIC EQUIPMENT
PLATING MATERIALS
ORGANIC COATINGS
CERAMIC MATERIALS
TIN & TIN CHEMICALS
METALS & ALLOYS
HEAVY MELTING SCRAP

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

Circle No. 65 on Reader Service Card.

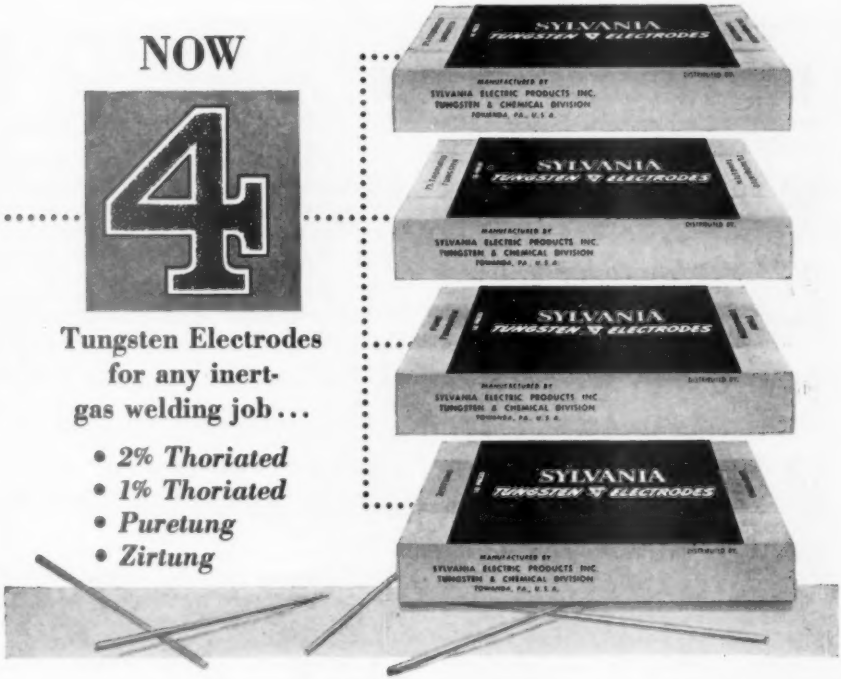
Sylvania has the complete line!

NOW

4

Tungsten Electrodes for any inert-gas welding job...

- *2% Thoriated*
- *1% Thoriated*
- *Puretung*
- *Zirtung*



In a welding electrode, you look for dependable performance, ease of handling, economy... and that is why Sylvania makes four tungsten electrodes. You get all of these benefits when you use the right rod for the job.

Whether you use atomic hydrogen, helium or argon in your arc welding... you'll find that one of the four dependable Sylvania tungsten electrodes will give you sound, clean welds. Each of these four top-quality electrodes is manufactured to exacting specifications to assure the uniform, stable arc you need for successful inert-gas welding. Each is designed to give you the utmost in economy; minimum tungsten loss in the arc.

Sylvania Tungsten Electrodes are supplied either with chemically cleaned, etched surface or centerless ground finish. Order them in handy packages of ten from your welding supplies distributor. For technical information write to:

SYLVANIA ELECTRIC PRODUCTS INC.
1740 Broadway, New York 19, N. Y.
In Canada: Sylvania Electric (Canada) Ltd.
University Tower Bldg., Montreal, P. Q.

SYLVANIA

Lighting • Radio • Electronics • Television • Atomic Energy

Circle No. 79 on Reader Service Card.

Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

49 **Goggles that cover all** are featured in literature featuring head and eye protective equipment. JACKSON PRODUCTS, INC. Inside Front Cover.

40 **Complete line of arc welders** for all applications are cataloged. HOBART BROS. CO. Page 1.

97 **Original gas saving method** which automatically cuts off gas and oxygen intake when not in use is featured. WELDIT, INC. Page 5.

95 **Tank welding equipment** is described in illustrated literature. WEBB CORP. Page 6.

19 **Everything for arc and gas welding** is listed in complete catalog. BURDETT OXYGEN CO. Page 7.

56 **Dye penetrant inspection of welds** and castings is explained. MAGNAFLUX CORP. Page 10.

28 **Complete line of welding wire** — for stainless and hard facing applications — is featured. DRAWALLOY CORP. Page 11.

3 **How to weld stainless steel** is explained in Catalog 9-131W. AIR REDUCTION SALES CO. Page 12.

91 **Every resistance welding need** — including tips, wheels and holders —are featured in catalog. W W ALLOYS, INC. Page 16.

15 **Two hundred positioner models** currently available are subject of illustrated literature. ARONSON MACHINE CO. Page 19.

48 **New portable grinding tool** with several unusual design features is subject of catalog. J & H PRODUCTS CO. Page 20.

10 **Cowhide gloves and how they protect** is subject of literature available. AMERICAN OPTICAL CO. Page 23.

69 **Light or heavy reinforced grinding wheels** for all weld grinding applications are described. NORTON CO. Pages 24-25.

88 **Lightweight flame cutting unit** is described in literature. VICTOR EQUIPMENT CO. Page 27.

152 **Automatic welding is easy** if you use proper positioning equipment. WORTHINGTON CORP. Page 29.

34 **Rectifier welders** and their exclusive features are subject of Bulletin GEA-6242. GENERAL ELECTRIC CO. Pages 32-33.

11 **Resistance welding products** are featured in complete catalog. AMPCO METAL, INC. Page 39.

33 **Resistance welding presses** are subject of illustrated brochure. FEDERAL MACHINE & WELDER CO. Page 41.

47 **Flux recovery systems** are subject of free folder. INVINCIBLE VACUUM CLEANER MFG. CO. Page 44.

94 **Wide vision safety lens welding goggles** are among head and eye protective equipment featured in catalog. WATCHEMOKET OPTICAL CO. Page 46.

53 **Combined A-C D-C welder** is featured in Bulletin 1343. LINCOLN ELECTRIC CO. Page 51.

54 **Metal-arc gas shielded welding** with carbon dioxide shielding gas is explained in catalog. LIQUID CARBONIC CORP. Page 55.

Black & Decker® electric tools mean low initial cost, lower operating cost, more convenience . . . and they're

POWER-BUILT TO LAST!

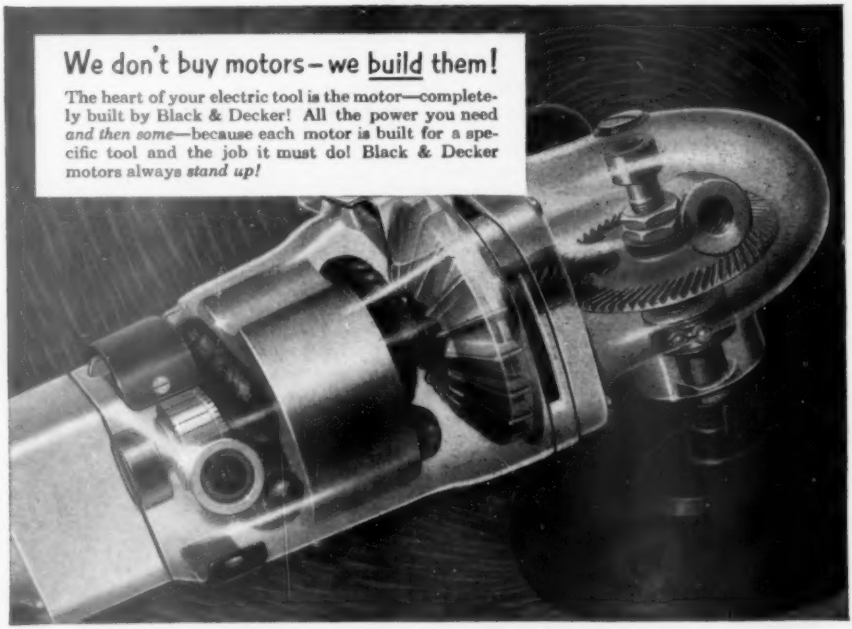
This Black & Decker 7" Standard Sander typifies the power, speed and accuracy of all B&D tools. It has 20% more power to handle your toughest sanding jobs—20% less weight to greatly reduce operator fatigue—spiral bevel gears to provide continuous, smooth power! These outstanding features coupled with its ability to sand, grind and wire brush, much faster and easier, make the 7" Sander indispensable to your work! For more information, write: THE BLACK & DECKER MFG. CO., Dept. 7606, Towson 4, Maryland.

Drills • Grinders • Hammers • Shears • Vacuum Cleaners • Black & Decker makes a complete line of portable electric tools.

Look in the Yellow Pages Under "Tools—Electric".

Service . . . one of 42 B&D factory service branches is located "next door" to you; to give fast, expert service!

BLACK & DECKER
PORTABLE ELECTRIC TOOLS


We don't buy motors—we build them!
The heart of your electric tool is the motor—completely built by Black & Decker! All the power you need *and then some*—because each motor is built for a specific tool and the job it must do! Black & Decker motors always *stand up!*

Circle No. 18 on Reader Service Card.

New instrument measures iron content in weld

The Ferritic Elcometer instantly and accurately measures ferrite content in a stainless steel weld. This new precision instrument replaces time-consuming destructive laboratory analysis. It enables you for the first time to make rapid, on-the-spot, nondestructive tests for iron content at various points along a weld.

Measures magnetic intensity

Operation is based on the principle that increase of magnetic flux intensity between two soft iron test probes of a U-shaped magnetic circuit reduces the forces in a spring-loaded magnetic needle in a parallel magnetic branch. Tension of spring is adjustable so that needle gives scale reading corresponding to ferrite content of standard reference sample.

Accurate readings in all positions

Needle locking device assures correct readings. Balanced in all planes—readings can be taken at any angle. Sturdily constructed. Comes in tough leather case. Fits in pocket. Write today for complete information.

FERRO CORPORATION
4139 E. 56TH STREET
CLEVELAND 5, OHIO

Circle No. 32 on Reader Service Card.

27 **Featherweight face shields** are featured in head and eye protection catalog. DOCKSON CORP. Page 62.

77 **Iron powder electrodes** and how to use them is subject of catalog. A. O. SMITH CORP. Pages 64-65.

63 **Heavy-duty sander-grinder** is subject of Folder SG2. MILWAUKEE ELECTRIC TOOL CORP. Page 73.

4 **Electrodes for welding cast iron** are featured in Catalog 1318-IW. AIR REDUCTION SALES CO. Page 75.

45 **Welding of dissimilar alloys** is explained in free folder. INTERNATIONAL NICKEL CO., INC. Pages 80-81.

73 **Portable grinding wheels** for use on right angle machines are featured in catalog. RAYBESTOS-MANHATTAN, INC. Page 87.

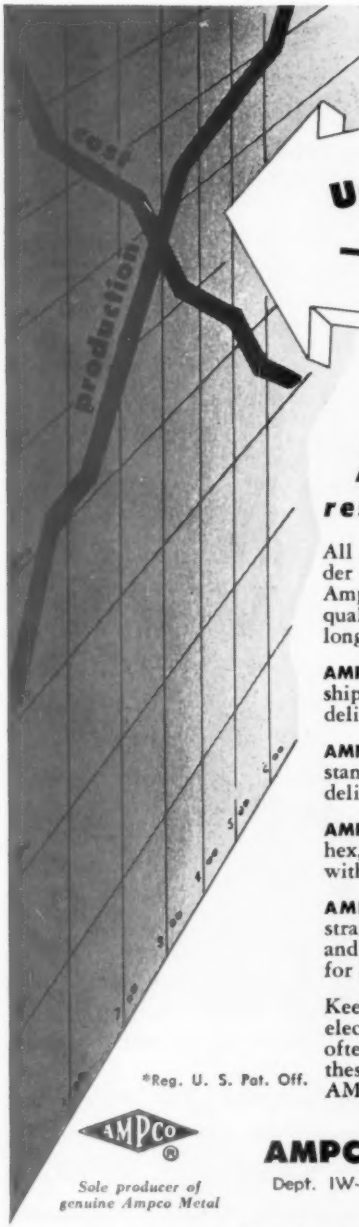
24 **Welding layouts made easy** is story told in catalog that explains use of pipe layout tool. CONTOUR MARKER CORP. Page 88.

51 **Single stage regulators** and how they work is explained in 24-page catalog. K-G EQUIPMENT CO., INC. Page 89.

81 **Temperature indicating materials** and how they are used in welding is explained. TEMPIL CORP. Page 96.

90 **Toggle clamp catalog** shows how these handle tools can position work for welding. WEST POINT MFG. CO. Page 94.

71 **Versatile magnetic plate clamps** and how they are used is subject of bulletin. Demonstrations are available. PORTOMAG, INC. Page 99.



Up goes production

— down goes cost

. . . when you use

AMPCO-WELD*

resistance-welding products

All AMPCO-WELD products are manufactured under a strict laboratory control system, unique with Ampco Metal, Inc., to provide unvarying, top-notch quality. Use AMPCO-WELD products to assure longer runs and lower costs:

AMPCO-WELD seam welding wheels — "off-the-shelf" shipment of rough forgings or finished blanks. Rapid delivery of wheels machined to your specifications.

AMPCO-WELD spot-welding tips — available in all standard-straight and cold-bent types for immediate delivery.

AMPCO-WELD bar and rod — shipment of round, hex, square, or rectangular bars of standard sizes without delay.

AMPCO-WELD holders — delivery from stock of straight, off-set, or universal ejector types. Offset and universal holders have interchangeable sockets for No. 1 and 2 tapers.

Keep your production up — use AMPCO-WELD electrodes and accessories. Of course, they meet and often exceed RWMA specifications. Start specifying these dependable products today. Contact your AMPCO-WELD Distributor or write for bulletin.

*Reg. U. S. Pat. Off.

AMPCO®

Sole producer of genuine Ampco Metal

AMPCO METAL, INC.

Dept. IW-6, Milwaukee 46, Wisconsin

West Coast Plant
Burbank, California

RW-16A

Circle No. 11 on Reader Service Card.

52 **A universal automatic welding fixture** is featured in literature. LEWIS WELDING & ENGRG. CORP. Page 101.

41 **Resistance welding machines, accessories and auxiliary equipment** are featured in complete catalog. ROBT. W. HOFFMAN CO., INC. Page 102.

20 **Protection equipment** for every welding requirement is included in safety catalog. CHICAGO EYE SHIELD CO. Page 109.

26 **Advantages of positioned welding** are listed in Bulletin WP26. CULLEN-FRIESTEDT CO. Page 112.

68 **Inside story on acetylene cylinders** is told in illustrated brochure. NORRIS-THERMADOR CORP. Page 115.

22 **Complete line of chipping hammers** is described in catalog. CHICAGO MFG. & DISTRIBUTING CO. Page 120.

31 **Electrode drying ovens**—how to use them and how to buy them—are featured. ESSEX WELDING EQUIPMENT CO. Page 121.

84 **Aluminum cable** and why it is efficient is explained in catalog. TWECO PRODUCTS, INC. Page 121.

78 **Individual slip-overs** for use on worn bucket teeth are subject of literature. STULZ-SICKLES CO. Page 123.

If all the INDEPENDENT Acetylene CYLINDERS

we have built were filled at one time they would hold more than

60,000,000

cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen storage cylinders available in 12 ft. & 20 ft. lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

WE INVITE YOUR INQUIRIES

INDEPENDENT ENGINEERING COMPANY, Inc.

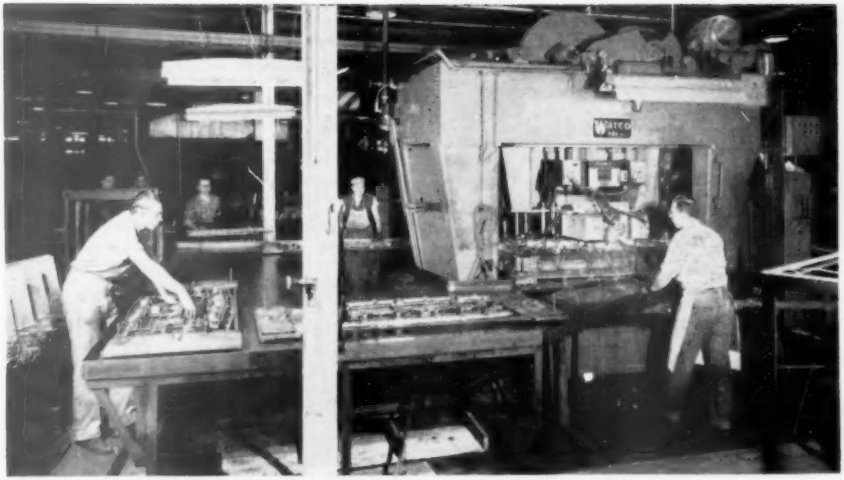
Manufacturers of

CONSULTING · RESEARCH · DESIGNING

CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

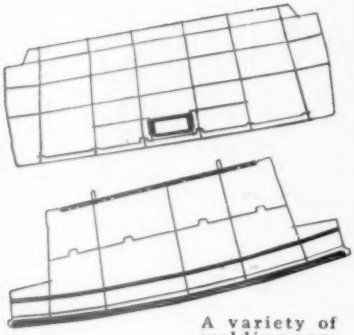
O'Fallon 2, Illinois

Circle No. 44 on Reader Service Card.



FEDERAL WELDING PRESS..

a complete seat frame with every press stroke!



A variety of welding capsules can be used with these presses. For a changeover in product, simply change the tooling.

Frames for automobile seat backs and cushions are being resistance welded on Federal Welding Presses at the Great Lakes Spring Division of Rockwell Spring and Axle Co.

Only Federal can offer single company responsibility in supplying both the mechanical welding press and the welder tooling based on their long experience in both press (Warco) and resistance welder (Federal) manufacture.

There are many manufacturing operations existing today where a mechanical welding press would pay dividends. If you have one of them, why not contact the one company best suited to provide the answer? That's *Federal — First in Resistance Welding*. Welding Press brochure on request.

Federal WELDERS ®

Warco PRESSES ®

9967A

THE FEDERAL MACHINE AND WELDER CO.

WARREN, OHIO

Circle No. 33 on Reader Service Card.

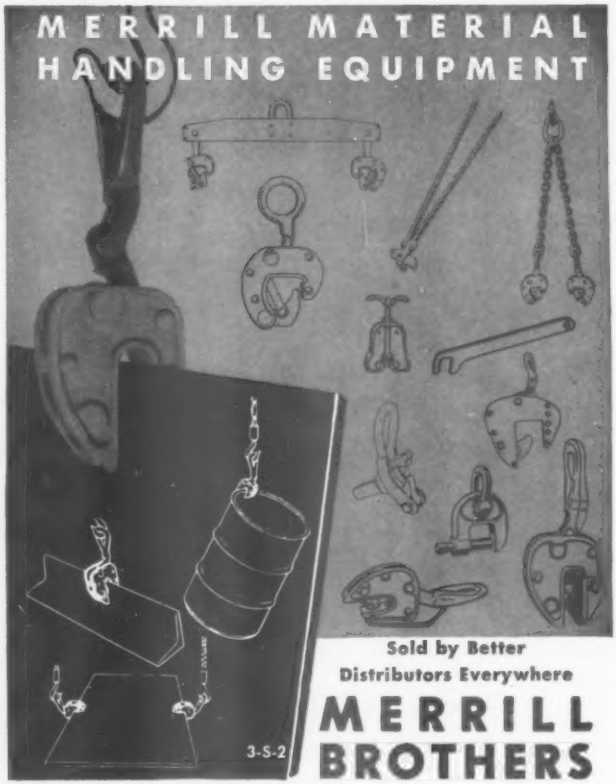
96 **Stop brazing alloy waste** is the message conveyed in literature describing stop-off compound which limits flow of alloys. WALL-COLMONOY CORP. Page 123.

75 **Smooth welds and how to get them** with midget mills is explained in catalog. SEVERANCE TOOL INDUSTRIES, INC. Page 124.

50 **Accurate pipe welding** with special pipe aligning clamps is explained. JEWEL MFG. CO. Page 124.

23 **Complete clamp catalog** lists and describes a variety of clamps. CINCINNATI TOOL CO. Page 127.

29 **Complete line of electrode holders** is featured in literature. DURO ENGINEERING CO. Inside Back Cover.



Sold by Better Distributors Everywhere

MERRILL BROTHERS

For Interesting Information write

56-79 ARNOLD AVE., MASPETH, N. Y.

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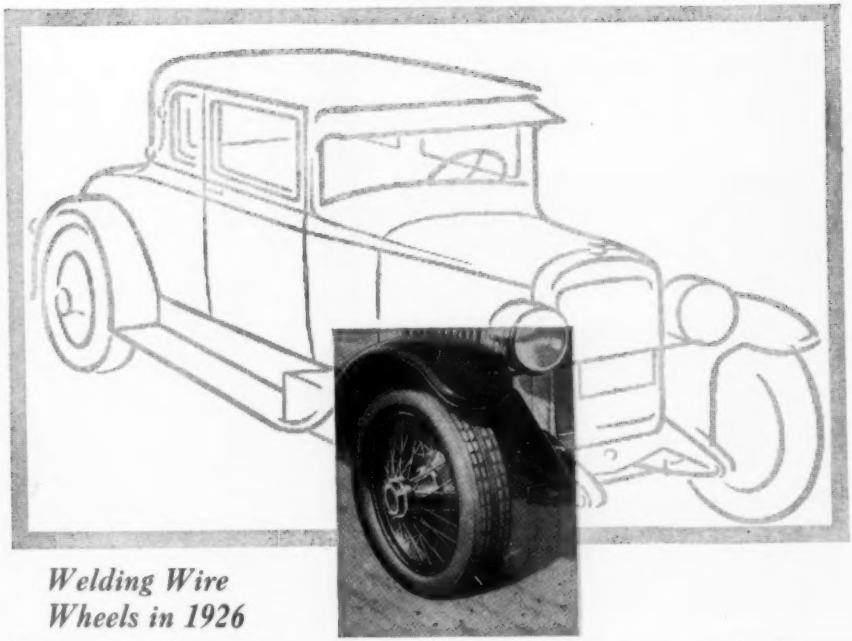

Welding Wire Wheels in 1926

Helped MALLORY Learn Better Ways to Solve Your Welding Problems Today

Thirty years ago, a leading auto manufacturer (still a leader today) ran into a serious production bottleneck in resistance welding of wire wheels. The copper dies being used wore out so quickly that costs were too high, production too slow.

Elkonite®, a material developed by Mallory, looked promising for this application. It was tried . . . and the results were excellent. Die life increased tenfold. And production was freed of stoppage troubles.

This development marked Mallory's entry into the resistance welding field. It has been followed, in succeeding years, by a continuous stream of contributions to welding technology. These are some of the major milestones in Mallory progress:

Specialized alloys, like Elkaloy® A, Mallory 3, Mallory 22 and many others, which provide a family of materials engineered for the specific needs of welding service.

Fluted electrodes, which greatly increase electrode life.

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio.

Cold forming methods for producing bent electrodes with greater hardness and strength.

Special holder designs to meet the needs for higher pressures for large welding machines, and low pressures for non-ferrous alloys.

The knowledge gained during three decades of pioneering activity and constant development stands ready to serve on your own resistance welding problems. Write or call Mallory for a personal consultation by a Mallory welding engineer . . . and see your local Mallory welding distributor for prompt delivery of the best in welding electrodes, holders, seam welding wheels, forgings and supplies.

30 Years of Welding Progress

P.R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO. Inc., INDIANAPOLIS 6, INDIANA

Circle No. 57 on Reader Service Card.

INVINCIBLE

Welding Flux Recovery Systems

MAKE 3-WAY SAVINGS

1. Valuable Flux Reclaimed. Automatic Invincibles recover all unfused flux and return slag-free, dust-free usable flux to the welder—all in one continuous operation.

2. Costly Man-Hours Saved. Invincibles do the complete job automatically — far more swiftly and efficiently than manual methods.

3. Fewer Expensive Rejects. Invincibles remove all fine dust (flux flour), thus reducing welding rejects and speeding production.

Many Important Advantages

- Ruggedly built to resist abrasive nature of flux.
- Compact and lightweight. Variety of models and flexibility eliminate need for tailor-made installations.
- Portable units also available.

Operating continuously, this Invincible recovers all unfused flux from pipe-seam welding operation at a leading automotive firm.

WRITE TODAY FOR FOLDER on Invincible Flux Recovery Systems.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

Circle No. 47 on Reader Service Card.

Service Life Increased 400% by ***Hard-Facing***

Hard-facing these entry guides with a wear- and heat-resistant HAYNES STELLITE alloy increases their service life from 4 to 5 times. Unprotected guides failed after handling only 40 tons of hot steel bars. Guides hard-faced with HAYNES STELLITE alloy handled up to 200 tons.

There are 14 HAYNES hard-facing alloys. Each was developed to resist a different type of wear. Whether your wear problem is caused by impact, abrasion, corrosion, erosion, or heat, HAYNES alloys will prolong the life of your equipment. Sound, uniform deposits are easily made with these alloys, using standard welding equipment.

Your local dealer carries a complete line of HAYNES hard-facing rods. Ask him for your free copy of HAYNES Hard-facing Manual. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

See... **Your local Haynes Stellite Dealer**

or

Write... **to Haynes Stellite Company**

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Wide Vision Safety Lens Welding Goggles

MODEL 490 G4

Soft Vinyl Frame form-fits face for greater comfort, better protection.

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NOTE: *Does not meet Federal Specifications for glass filters.*

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Eye Savers Lenses will not shatter or splinter with impact . . . will not pit. Lenses are easily replaced by removing the "lock bar" that positively locks the lens in the frame. No special tools needed.

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Extra wide 6" lens in the large vinyl frame provides ample space for metal or horn rimmed glasses. Frame forms a bumper that prevents the lens surface from touching when goggle is laid flat on a table or bench.

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A new principle in goggle ventilation, Stac-Vent, proven to provide clearer fog-free vision, more comfort and greater safety. MODEL 440 clear frame and MODEL 460 Transparent Green Frame Goggles available with Clear or Green Lenses.

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See your Authorized Eye Savers Supplier, or write direct for full information on the New Welding Goggle and other Eye Savers.

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Almost 100% protection in a lightweight, comfortable spectacle with over-eyes visor protection and semi-cup side shield protection. Furnished with medium green (G4) or dark green (G6) methacrylate lenses.

Ideal for wearing under welding helmet and for working in welding areas. Replaceable lenses snap-in-out; Retrax temple telescopes to perfect fit and easy comfort. Visor-Tucs weigh slightly over an ounce.

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An » Industry & Welding « Exclusive

"POSITIONEERING"

"Positioneering is the science of positioning a workpiece as a means of improving quality, increasing production and lowering manufacturing costs."

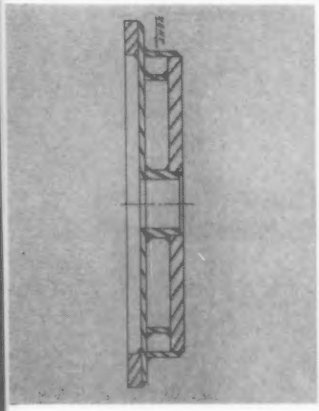
by **CHARLES N. ARONSON, President, Aronson Machine Co., Arcade, N. Y.**

STARTING in this issue, INDUSTRY & WELDING presents a series of articles based on this theme. It is the most comprehensive and authoritative treatment of the subject that has ever been published.

Subject matter to be covered includes many basic welding fundamentals such as practical definitions of various welding terms, weldment designs and shapes, weight factors, locating center of gravity, calculating weights, mechanics of positioning, mounting weldments and use of fixtures.

Also to be covered in future installments are the following subjects pertaining to positioning for welding; selection of positioners as they affect production rates, data sheets to help determine need and applications of positioners, positioning and positioners in general.

Never before available in such complete detail, certain colleges have indicated their intent to use "Positioneering" in their engineering courses. It will be presented to metalworking and welding users in this country exclusively through INDUSTRY & WELDING Magazine. Save each part to complete your own textbook on positioning.



CIRCULAR LINE WELDMENT . . .

. . . an assembly of two or more parts by welding in which line of union (or joining) is a curved line having a common center. A pure example of this type of weldment is gear blank above.

POSITIONEERING

PART 1 FUNDAMENTALS

THIS is a basic study and will not deal with elaborate, fine-haired phases. You need not be an engineer to get full benefit from the lessons. Where needed, physical mechanics, arithmetic, etc., will be included, defined and examples given to make clear exactly how they apply to *Positioneering*. With full understanding of the principles on which the Science of Positioning is based, you will readily accept specific problems, find solutions.

To make this easier to write and, we hope, easier to understand, where we use the word *Arc* we mean "the point of fusion," which can be the arc or the tip of the gas flame. In *Positioneering* we must not forget to provide proper means of conducting the current through the Positioner, even though in the double electrode carbon arc process and in gas welding no current flows into the work. If the Positioner will satisfactorily conduct the flow of current used in metal arc welding, it will also satisfactorily serve other processes.

Then there are two very broad classifications of Welding which greatly affect *Positioneering*, namely, "Manual" and "Automatic" Welding. The basic reason the effect is so great is due to man's ability to precisely and quickly adjust to varying conditions; as opposed to a machine which is generally less responsive. The term "Automatic" Welding, like the term "Automation," is overworked because it is not definitive enough. It would have been far better in the beginning if industry had used the term "mechanical" welding rather than "automatic" welding when we meant simply that it wasn't "manual" welding.

Definition of Basic Terms

In this work we will define terms according to what the author means by those terms. Then we'll all know what he is trying to say. We cannot operate if all of us must first agree to the meaning of a term before we use it, because there are too many meanings for too many words. Here are a few words and terms and what the author thinks they mean.

WELDING means joining metallic parts by heating to allow a flowing together, with or without pressure, with or without adding a "binding" metal.

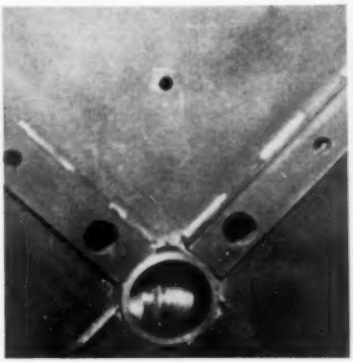
RESISTANCE WELDING employs pressure and heat from the resistance of the metal to the passage of a current at a local "spot" giving rise to the term "spot" welding. In general, this type of welding does not lend itself to positioning as we mean it in *Positioneering*, but involves specific fixturing included with the welding machine.

FUSION WELDING employs heat but not pressure. Some processes add a "filler" metal, some do not, but all Fusion Welding effects a melting and flowing together to join the parts. In this training program, when we say welding we mean Fusion Welding.

BRAZING and SOLDERING is

STRAIGHT LINE WELDMENT . . .

. . . an assembly of two or more parts by welding in which line of weld is essentially a straight line. Simple sub-base (left) has only straight line welds. Next two—table top (center) and trunnion beam and barrel (right) show that many weldments are often a combination of straight line and circular welding.



a heated cementing of parts to effect a union. Metals do not flow together, only the "binding" metal melts. In this work we will tend to concern ourselves with Fusion Welding, though when you understand *Positioneering* as it applies to Fusion Welding you will also understand Brazing and Soldering Positioneering.

GAS Welding is where the heat is supplied by the combustion of a gas.

ARC Welding is where the heat is supplied by the passage of a current across a gap.

MANUAL Welding is any welding process where the *man* manipulates the arc or torch *manually* by hand. With practice the man (called weldor to differentiate him from the machine source of current, the welder) becomes expert in guiding his torch or rod and can follow the work even when it makes relatively great deviations from the true path. Positioners suitable for Manual Welding, therefore, need not be as precise as for welding which does not have this feature of man's instant responsiveness.

AUTOMATIC Welding is any welding process where the arc or torch is held and guided by a mechanical means. To further divide into "Fully-Automatic" and "Semi-Automatic" is a waste of time in this program. The main difference we are concerned with in this study is that in one process group the many can make up for shortcomings of the Positioner, while in a mechanically held arc or torch welding process the Positioner has to be precise enough to obviate any need for the weldor to minutely and skillfully correct for deviations from the desired speed and location of the workpiece, the weldment.

WELDMENTS fall into two very distinct classifications: CIRCULAR LINE AND STRAIGHT LINE.

CIRCULAR LINE Weldment is the assembly of two or more parts by a welding process in which the line of union (or joining) is a curved line having a common center. A pure example of a Circular Line Weldment is the Gear Blank shown in accompanying illustrations.

These show an actual part as created on the drawing board by the designer-engineer, the sectional drawing; then the part as it comes from the weld-shop; the *weldment;* and finally, when it has been stress-relieved machined and teeth cut. The day the customer uses the machine of which bevel gear is a part, this weldment will come to life.

Now is as good a time as any for you to get a companionable feeling toward mechanical things. The user, the salesman who sold it, the machinist and weldor who make it, and the designer who created it can all live better with it if they do to it as they want it to do to them.

The Machine is what makes Man materially different from lower animals. Respect it.

STRAIGHT LINE Weldment is an assembly of two or more parts by a welding process in which the line of weld is essentially a straight line. Three examples are shown in accompanying illustrations.

The Sub-Base shown is simple, has only Straight Line Welds, while the other two illustrate that seldom in actual use are there many weldments made wholly of straight line welds, especially in

(Continued on Page 75)

When one welder gives both AC and DC...

Handles every type of electrode...

Yet costs less to buy and operate...

WHY

shouldn't you be using IDEALARCS for your production welding?

Certain electrodes work best on... AC

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Some rods that work best on DC in smaller sizes... DC

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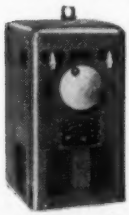

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with its instant selection of AC or DC gives optimum performance *on every type and size electrode.*

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U-groove in back of butt joint is flame gouged prior to making back-up weld.

Back side of a butt-weld is removed by gouging. Outside was welded first.

How and Where to Use F

YOU can use flame-gouging in a wide variety of fabrication, alteration and maintenance jobs. Since it is convenient, fast and economical, all operators should be as familiar with gouging techniques as they are with welding and cutting.

The uses to which flame-gouging can be put are almost limitless. It can cut away tack-welds without damaging the two parts. You can use it to scour the underside of an initial weld when welding is to be done from both sides. Defects can be repaired by gouging the bad spot and filling the hole with fresh metal. This means much less cutting and patching.

Edges and surfaces of castings can be trimmed to minimize machining. When welding two pieces of thin plate, job is made easy by setting two plates side by side and beveling both edges at the same time by gouging. Time needed to prepare cracked and broken parts for welding by grinding and chipping can be saved if flame-gouging is used to gouge out metal around the crack.

Oxy-acetylene flame-gouging is generally limited to removal of surface metal from steel contain-

Clean removal of welded bracket is made possible by use of flame gouging.

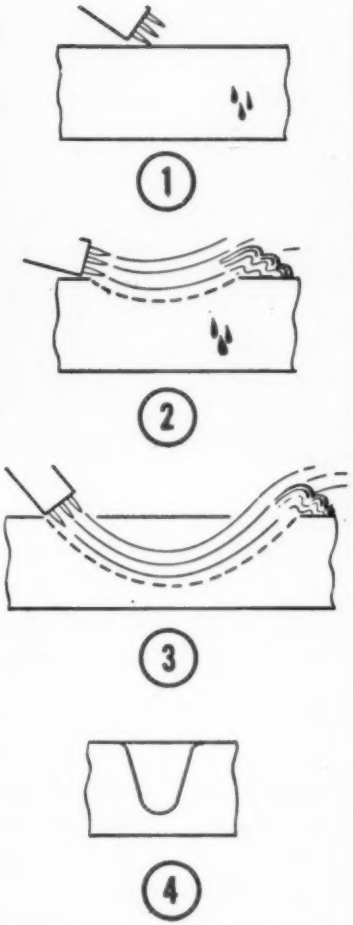
Flame Gouging

ing 0.35 percent carbon or less. With other steels and some alloys, the heat of gouging process may cause cracking. In these cases, part must be heated prior to gouging and allowed to cool slowly after the grooving. Scraps of alloy should be tested to make sure that heating will not produce any undesirable effects.

Good results can be obtained with cast steels, but cast iron cannot be flame-gouged.

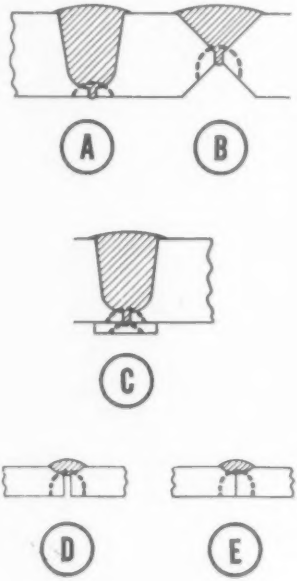
Malleable iron can be gouged, but hardening will result and the flexible quality of the metal in

How to Flame Gouge Defects

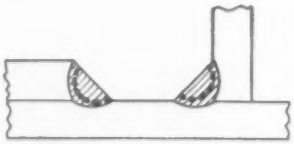


To flame gouge defects: (1) preheat behind spot, (2) draw nozzle back and reduce working angle, (3) increase angle gradually until defects are gouged out (4).

Other Flame Gouging Uses



Examples of gouging for back-chipping include (A) U-groove; (B) double-vee; (C) U-groove with back-up strip; (D) spaced butted; (E) unspaced butted plate.



Structural members are not affected in gouging out fillet welds. Dotted lines show amount of weld removed in dismantling structures by gouging.

the treated area will be reduced. However, this loss of malleability presents no problems if the metal is being prepared for welding, as the heating slow cooling of the part during the welding process will make the metal as flexible as it was before gouging.

Little Special Equipment

The only special equipment needed to flame-gouge is a nozzle or series of nozzles for various sizes of cuts. These fit on standard cutting blowpipes.

In making a gouge, first hold the blowpipe at an angle of about 30° to the surface of the metal, with the tip pointed in the direction you are going to cut. Train the preheat flames on the spot where gouge will begin. When metal becomes bright red, gradually depress the cutting-oxygen lever, and at the same time bring the nozzle down to an angle of about seven degrees.

Then move the blowpipe forward along the line you want to groove. If the angle is greater than seven degrees, slag will flow back into the groove and the cut may be too deep. On the other hand, if the angle is less than seven degrees, groove will become too shallow and you may lose your cut.

Control Nozzle Angle and Height

At first hold the blowpipe so that inner cones just touch the surface. However, nozzle angle and height must be controlled when making groove so that tips of the cones are ¼-inch to ½-inch behind the spot where cutting is being done. Move the blowpipe along the axis of the cut, holding the nozzle at the seven degree angle, with the tip slightly in the groove. As cut progresses, slag is blown out the front.

Depth of the groove can be made

(Turn to Page 57)

VITAL NEWS FOR USERS OF METAL-ARC GAS SHIELDED WELDING

IF YOU PAY MORE THAN 1½¢ PER FT. FOR SHIELDING GAS...YOU'RE PAYING TOO MUCH!

A new all-CO_2 gas process by Liquid Carbonic saves approximately 7¢ on every foot of shielding gas used. Expensive argon or helium are entirely replaced by low-cost CO_2 in metal-arc gas shielded welding of carbon steels.

High quality, high speed welds. The new Liquid Carbonic all-CO_2 MAGS process (metal-arc gas shielded welding) produces welds which are equal or superior in both speed and quality to welds made with argon or helium shielding.

Adaptable to both hand and automatic equipment. Your present equipment can probably be used, either "as is" or with modifications. There is no extensive "change over" period with the new Liquid Carbonic all-CO_2 MAGS welding process.

Low cost multiplies the possibilities for shielded gas welding. By greatly reducing shielding gas costs, Liquid Carbonic's all-CO_2 process makes the many advantages of shielded gas welding available for even "low budget" applications.

A special welding grade CO_2 gas, specifically manufactured for gas shielded welding, has been developed by Liquid Carbonic. This gas is of the highest purity and packaged in specially marked 50 lb. (435 cu. ft.) cylinders. New Red Diamond Welding Grade CO_2 assures the highest possible metal-arc gas shielded welding performance.

Welding a pulley with Liquid Carbonic's new all-CO_2 MAGS process. In addition to cutting welding costs, new process virtually eliminates warpage because of reduced heat input.

Complete technical and operating data on this new welding process is available. For your free copy of Liquid Carbonic's fact-filled new booklet on all-CO_2 metal-arc gas shielded welding, simply mail the coupon below.

THE LIQUID CARBONIC CORPORATION
3162 S. Kedzie Ave., Chicago 23, Illinois

Please send me complete technical and operating data on Liquid Carbonic's new all-CO_2 process of metal-arc gas shielded welding.

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Low cost–high speed hard-facing with the new METCO THERMOSPRAY process

Hard-facing pump rod with the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

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NOW— Metallizing without compressed air

New Metco ThermoSpray Gun — Spray stainless steels, bronze — restore worn or damaged machine parts. Lowest installation cost ever—save up to 90% of replacement costs.

Now, with the development of the new METCO THERMOSPRAY GUN for spraying powdered metals, the cost of a metallizing installation is less than a third of the cost of a wire gun installation. Here's a great opportunity to get into profitable money-saving metallizing operations with a very modest outlay.

With the Type P THERMOSPRAY GUN, a tank of oxygen and one of gas, a few accessories, and *you're in business.* You can do a wide range of metallizing work—build-up with harder, longer-wearing, corrosion-resistant stainless steel or bronze. Build up worn pump plungers, motor shafts, and many other types of machine parts. Do your own hard-facing, too. (See opposite page.)

Free bulletin — send the coupon for a new bulletin describing the METCO Type P ThermoSpray Gun — or better still, ask for a demonstration in your own shop by a Metco field engineer. He'll be glad to show you how the new METCO ThermoSpray Gun works on some job of your own. No obligation, of course.

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FLAME GOUGING . . .

Continued from page 54

greater by increasing the angle of the nozzle and slowing the speed of advance. Once the proper depth has been attained at the start of a cut, it is a simple matter to maintain the same depth for the length of the gouge.

Spot-gouging is a technique used to make small-area holes. Removal of known welding defects is an example of this.

To perform this operation, first mark the surface over the imperfection with chalk or soapstone. Preheat a spot behind the marked area to make certain that entire defect is removed. In addition, make certain that the hole is wider at the top than at the bottom in order to have the slag blown out the other side.

The angle of the nozzle is increased instead of decreased from the initial 20° making the cut grow increasingly deeper without adding to its length. Defects will appear as lighter or darker spots compared to the color of the molten base metal.

The inner cones should be kept 1/16-inch above the plate surface during the spot-gouge. When finished, the result is a narrow, U-shaped hole that can be filled easily with welding rod.

Photos and drawings courtesy Linde Air Products Co.

W. W. Roff Appointed Director Canada Talc

W. Wallace Roff, executive vice president and director of Whittaker, Clark & Daniels, Inc., has been appointed director of Canada Talc Industries, Ltd. This Canadian concern is said to be the oldest and largest producer of talc in Canada, with mines and mills located in Ontario.

1 OXY-ACETYLENE
2 MANUAL ARC
3 MANUAL SUBMERGED
4 MANUAL INERT ARC
5 AUTOMATIC SUBMERGED
6 AUTOMATIC INERT ARC

WHICH Welding Process?

Three more economic factors that govern the choice of a welding process—cost of joint preparation, direct labor costs and general overhead charges—are discussed in detail in the second half of this authoritative article.

G. F. W. BARRETT
Plant Welding Engineer
Dominion Bridge Co., Ltd.
Lachine, Quebec

THE cost of a welding process is not confined to the actual action of fusing the members together. All material must be cut to size, edges prepared in some fashion, surfaces cleaned to varying degrees and components assembled before welding can be done. Each welding process requires a different degree of perfection in these phases of preparation for economical and satisfactory performance. Extra costs incurred to attain this goal must be charged against the process when evaluating it.

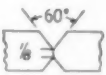
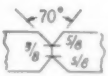
As an example, while it is desirable to always obtain the best fit-up possible, there is much more leeway with manual welding than with the automatic processes. Gaps may vary, included angles in vee joints are not as critical, and rust and scale, while undesirable, are less dangerous than on submerged arc or inert gas welding. The greater the joint perfection desired, the higher the preparation costs will be.

Labor Costs

When choosing a process, direct labor cost is the one which is most often thought of. Unfortunately, other cost factors are often ignored as it is commonly assumed that labor is the largest item in a production cost breakdown. It is a fact, however, that many items are produced with fast welding rates without any cost saving, because

Typical Example of Method of Evaluating Welding Processes

WELDING OF 1½" PLATE - FULL STRENGH WELD

FACTOR	MANUAL METALLIC ARC	SUBMERGED ARC MULTIPASS	SUBMERGED ARC TWO PASS	INERT GAS METAL ARC
A. Equipment Cost.....	—	—	—	—
B. Equipment Maintenance % of Labour..	—	3%	3%	5%
$.....	—	0.42	0.25	0.85
C. Weld Material.....				
Cost per Joint.....	$17.60	$24.10	$11.60	$66.20
D. Preparation.....	Burn and Back Groove	Burn and Back Groove	Burn and Edge Plane	Burn—No Back Groove
Cost of Material.....	2.52	2.52	.84	2.52
Labor $.....	7.85	7.85	10.50	4.38
E. Direct Labour—				
Time (incl. set-up)....	21 hrs.	8.1 hrs.	5 hrs.	10 hrs.
Cost $.....	36.70	14.20	8.75	17.50
Total Labour (B+D+E)	46.55	22.47	19.50	22.73
50% O.H.....	23.28	11.24	9.75	11.37
150% O.H.....	69.83	33.71	29.50	34.10
Total Material Cost.....	20.12	26.62	12.44	68.72
Total Cost @ 50% O.H.	89.95	60.33	41.44	102.82
Total Cost @ 150% O.H.	136.50	82.80	60.44	125.55

preparation, delays incurred by the process, and material costs outweigh any time saving.

The direct labor (and overhead) items can be estimated with relative accuracy for each process by a combination of experience, time study analysis and, whenever possible, a good cost accounting system.

In considering the direct labor cost of any process, the following factors must be carefully considered:

A. Set-up time for equipment.
If special equipment must be moved to a new location, electrical and cooling water connections must be made, supports of process equipment arranged etc. All these items must be considered.

B. Handling of material and equipment during welding cycle.
Where a heavy or cumbersome unit is being welded, the time taken to position it for downhand welding with one process can conceivably be balanced by all-position welding with another process. It should be noted, however, that this is seldom the case. If the process equipment is cumbersome, time taken to position it might also become an important factor.

C. Weld cleaning cost.
All welds on all products must be cleaned to some extent. The slag, spatter and rough areas must be removed. These factors vary from process to process and their cost must be considered when choosing the one to be used.

D. Speed of welding.
This, of course, is the most significant of the direct welding labor costs. To evaluate the factors, each of the processes will be considered. In manual metallic arc welding, there are three factors affecting the direct welding time. They are: 1.) the duty cycle possible, 2.) position of welding and its effect on current and size and, 3.) the type of electrode used.

The duty cycle, or percentage of arc time to total time, with manual welding is relatively low. After burning off each electrode, the operator must raise his shield, clean the end of the weld, change electrodes, relocate the electrode in the weld area, lower his shield and then strike an arc. In some types of welding duty cycles run as low

Typical Weld Deposit Rates

ELECTRODE TYPE	DEPOSITION RATE Weight of Deposit per 100 amps per minute
E-4510	0.038 lb.
E-6010	0.044 lb.
E-6012	0.044 lb.
E-6013	0.040 lb.
E-6016	0.034 lb.
E-6020	0.048 lb.
E-6024	0.053 lb. (Iron Powder type)
E-6027	0.053 lb. (Iron Powder type)

Manual Submerged Arc 0.05 lb./100 amps/Min. varying from 0.04 to 0.06.

Automatic Submerged Arc 0.06 lb./100 amps/Min varying from 0.03 to 0.07.

Manual Inert Gas 0.055 lb./100 amps/Min. average.

EFFECT OF ELECTRODE TYPE ON DEPOSITION RATES (18x¼" ELECTRODES at OPTIMUM CURRENTS)

ELECTRODE TYPE	PER ARC HR. LBS.	PER HOUR LBS.
E-6012	7.8	3.1
E-6016	7.4	3.0
E-6020	9.4	3.4
E-6027	16.7	7.17

Deposition per hour is based on rod burn-off time plus 2.3 minutes per electrode for cleaning, changing, etc.

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as 25% (neglecting set-up and other non-welding time losses) while on production line work 60 to 65% figures can be obtained.

The position of welding greatly affects welding speed. With downhand welding, large electrodes and high currents result in reduced arc times. Electrode changes are also decreased permitting a reduction in lost time. When vertical or overhead work is done, currents must be decreased and spatter loss increased. This also causes greater operator fatigue and lower working efficiency. The position also indicates to some extent the type of electrode which may be used.

Electrode Affects Speed

Type of electrode has a considerable bearing on speed of welding. The factors which affect speed are the weight of the individual electrode, current the electrode can carry and amount of metal deposited per electrode. These can be combined and considered as "weight of metal deposited per arc hour". The weight of deposit per electrode also has a separate effect since it governs the number of rod changes which must be made in order to deposit a given weight of metal. The fewer the electrode changes, the higher the duty cycle can be, and this is reflected in the "weight of deposited metal per hour elapsed time".

Accompanying chart shows the effect of different types of electrode on metal deposited "per hour" and "per arc hour" for ¼" diameter electrodes at the optimum current for each.

Another method of evaluating welding speed is to express it as "weight of deposit per 100 amperes per minute" for each electrode type.

The values listed are average deposition rates for electrodes produced by many manufacturers and do not necessarily apply to any one manufacturer. It should also be remembered that optimum current ranges are not the same for each type of electrode and, as a result, the proper current range must be used for each as a multiplier when making comparisons.

In manual submerged arc welding, the speed of welding is considerably greater. The continuous feed of wire means that the duty cycle can be high if the set-up is suitable. Currents which can be used are higher than for manual welding the deposit of metal is in the range of 21.5 pounds per arc hour at 600 amperes current.

The deep penetrating character of the submerged arc process results in considerable economy of material so that high deposition rate is not the sole measure of speed. Because of this, the manual submerged arc process can show remarkable advantages over manual welding on medium-sized welds.

Inert Arc: Pro and Con

Manual inert gas welding possesses some of the speed advantages of manual submerged arc but the current range for using the process by hand is lower. As a result, the maximum deposit per arc hour is not as high. However, since neither equipment is often used at its extreme limits of current, the speed of welding is of the same order. The inert gas process does possess speed advantages on complex work since the visible arc

(Continued on Page 81)

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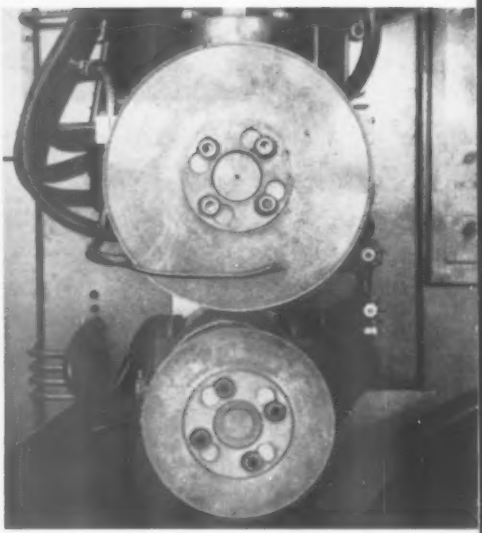


Proper cooling of resistance welding electrodes can help prevent mushrooming. External cooling of electrodes (left) is done during stitch welding. Seam welding wheels (right) are cooled externally by a cascade from perforated tubes.

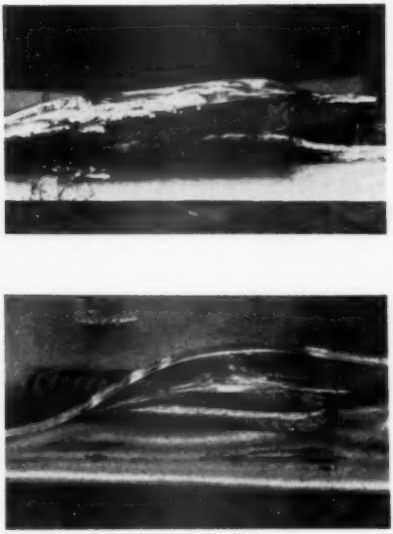
Resistance Welding

by P. M. HOWARD and D. WILCOX
Rolls-Royce of Canada, Ltd.
Montreal, Quebec

THE inception of the gas turbine engine brought with it a demand for alloys with resistance to oxidation and high strength at elevated temperatures. To meet this demand the so-called high temperature alloys were developed, and today such alloys are many and varied. The majority are basically nickel or cobalt, to which additions have been made to increase their strength and resistance to plastic deformation at elevated temperatures, and also to make them susceptible to various heat treatments.

Components fabricated from these materials, for example, the combustion chamber of the gas-turbine engine, must operate at temperatures as high as 1850° F. so that many conventional methods of joining cannot be employed. Shielded arc welding can be used but in many cases the thin gauge of material and complexity of structure renders this process impractical. It is in these applications, therefore, that resistance welding is of primary importance as the process is speedy and, with

Chisel test is speedy method of quality control. It gives a true picture of machine performance and weld quality.



Spot weld must not tear apart along common weld surfaces (top); parent metal should tear at weld edge.

High Temperature Alloys

proper equipment, strict quality control can be maintained.

Welding High Temperature Alloys

The properties of a material which affect resistance welding generally, are practically the same as those for the great majority of high temperature alloys: high electrical resistivity, low thermal conductivity, high resistance to deformation and no phase change on rapid cooling from the welding temperature.

Therefore, to spot weld these alloys:

(A) amperages of a lower order are sufficient to generate adequate welding heat;

(B) heat must be generated slowly if an explosive effect at the interface, resulting in expulsion of metal, is to be avoided; hence a long welding time is employed;

(C) high pressure is necessary to forge the nugget;

(D) a long pressure cycle is necessary to ensure complete solidification and forging of the nugget;

(E) The rapidity of the cooling cycle does not lead to

cracking or imbrittlement provided the machine settings are correct*

Stitch welding or over-lapping spot welding of high temperature alloys is employed where a gas-tight joint is required in a position inaccessible to the wheel electrodes of a seam welder. Characteristics of the weld cycle for this process are the same as for spot welding, i.e. slow heat input, high forging pressure, long forging period; however, there is one important point which must be considered. It is good practice to insist that the spot welds overlap 60-70%, thus, due to the indentation of the previous weld, the electrode-work piece contact area is considerably reduced. To compensate for this, and thereby prevent excessive electrode indentation, the electrode pressure must be reduced. This pressure correction does not depart from the principle that high temperature alloys, due to their high resistance to deformation, require high forging pressures. The reduction in pressure only compensates for the reduction in the electrode-work piece contact area, and thus the electrode pressure per unit area is of the same order in the spot, and over-lapping spot processes.

Cool During Stitch Welding

Stitch or over-lapping spot welding is a continuous process—is carried out at a speed of 50-70 welds per minute, and in such a process the dissipation of heat generated at the electrode-work piece interfaces becomes a problem. If the electrodes are not adequately cooled, the heat generated at the tip combined with high electrode pressure will give rise to rapid mushrooming of the tip. An increase in electrode-tip area greater than 10% cannot be tolerated, as the resultant drop in current-density per unit area would cause unsatisfactory welds. It is imperative that steps be taken to cool the electrodes.

Electrodes with a deep water hole should always be employed for stitch welding, and operators must ensure that the cooling water input pipe in the holder extends to the bottom of the water hole. This cooling, however, is inadequate, and external water cooling should be employed. Experience has shown that this system of cooling has trebled electrode life.

The contour of electrode-tips for spot and seam welding high temperature alloys is also important, if the maximum electrode life is to be obtained. It has been found that flat tips give superior service under conditions of high temperature and high pressure. Radius tips, on the other hand, are more difficult to machine, and the radius is rapidly destroyed by the high pressure and heat generated during the welding process.

Air-operated electrode-tip dressers have been found valuable in increasing the production of stitch welding machines. The electrode-tip form they produce has proved to be sufficiently accurate, and a

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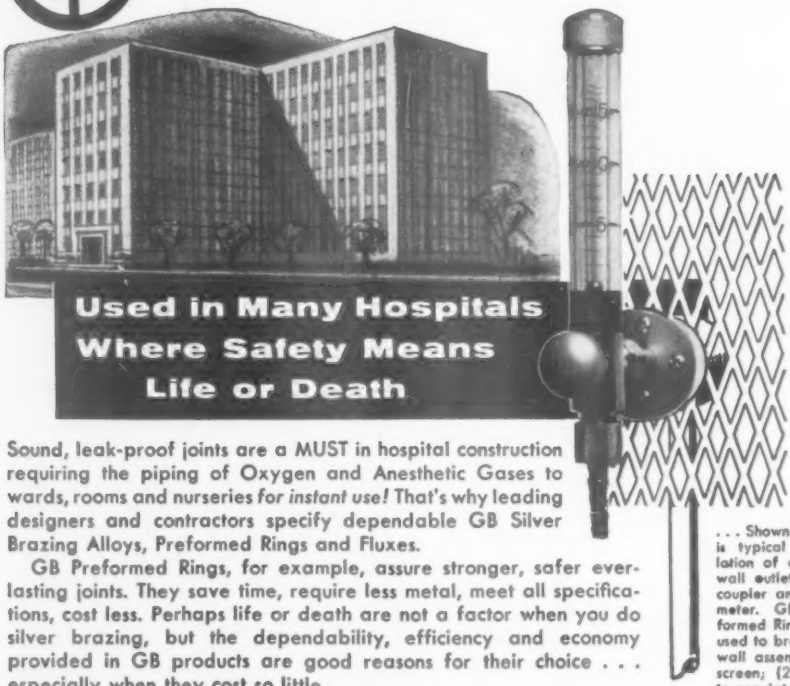

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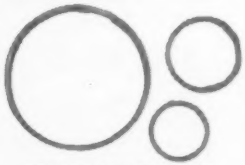

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closer control of electrode-tip diameter can be maintained.

The welding techniques for seam welding high temperature alloys is the same as that required for spot welding but, in this instance, the electrodes are continuously revolving discs through which the work piece is passing. How then, at a given point, can heat be generated slowly, and adequate forging pressure be applied? This is done by adopting slow welding speeds so that, during the complete welding and forging cycle, the wheel has traveled only a very short distance. A maximum of one foot per minute is recommended for sheet of the order of .064 thick, where 12-14 welds per inch are required for a high quality seam weld.

Recently the intermittent drive feature has been added to the seam welding machine. This enables the wheel electrodes to be actually stationary during the welding cycle and thereby strict control of the welding and forging periods can be maintained. Immediately the weld is completed the work moves forward an exact distance, stops, and the next weld is made.

120 Welds Per Minute

This description of the intermittent drive technique (for welding .064" thick Nimonic 75 sheet) gives the impression that the welding speed would be very slow, but the actual weld cycle is as follows: total weld time consists of 2 impulses of 6 cycles of heat with 1 cycle of cool time between a total of 13 cycles; the forge time is 11 cycles; the motor drives for 6 cycles. Therefore, the total welding cycle is completed in 30 cycles, i.e. the welding speed is 120 welds per minute.

The optimum weld spacing is 12-14 welds per inch on this gauge of material, therefore the speed of the work through the machine is 9-10 inches per minute.

Thus the intermittent drive feature, while enabling the weld to be made under ideal conditions, is not a great deal slower than the maximum continuous drive welding speed required for production of sound welds.

Welding of Dissimilar Metals

So far only the welding of similar materials has been considered, but it is often necessary to weld high temperature alloys to low carbon steel. An example of this is the air casing which encloses the flame tube of a Gas Turbine Engine. In this component only the sealing ring at one end is subjected to conditions which warrant the use of a high temperature alloy, therefore the remainder is fabricated from low carbon steel for the sake of economy.

Low carbon steel has low electrical resistivity and high thermal conductivity in comparison with Nimonic 75. Furthermore, its resistance to deformation is low, which necessitates the use of low forging pressures if excessive indentation of the electrodes into the work piece is to be avoided.

Now, if the conditions at the interface of two such materials as a high temperature alloy and low carbon steel are examined, it would be found that the electrical resistivity would be high due to the low electrode pressure, and the pres-

(Continued on Page 72)

ence of low carbon steel. Therefore, shorter welding periods and higher amperages than those needed for welding two pieces of a high temperature alloy would be required. Also, the heat would dissipate more rapidly into the low carbon steel than the high temperature alloy, so that when melting occurred, the fused zone would extend more rapidly into the material of lower thermal conductivity and the result would be a one sided nugget.

To improve this situation, the electrode-tip diameter on the low carbon steel side may be decreased to give a greater current concentration per unit area. Also, an electrode of higher resistance may be employed on the low carbon steel side which would increase the electrode-low carbon steel interface resistance, and thereby generate further heat at this point. On some machines it is possible to pass a unidirectional welding current into the low carbon sheet side to centralize the nugget a little.

In the majority of cases, when high temperature alloys are resistance welded to materials with properties similar to low carbon steel, this one-sided nugget has to be tolerated, and the penetration requirements of Mil-W-6858 are impossible or extremely difficult to meet. Tests have shown that properties of such welds are perfectly satisfactory.

Cleaning for Welding

Brushing of the surfaces to be welded, using stainless steel rotary brushes, has been found to be the best method of cleaning high temperature alloys for welding. But there is an incorrect method of carrying out this operation. If the brushes are passed lightly over the surface of the material, the tenacious oxide film is not removed. While the metal will appear clean and shiny, considerable variations will be found in the welding characteristics of the alloy.

To effectively clean these alloys, considerable pressure should be exerted by the work piece on the revolving brush to ensure that the oxide film is removed. The material should have a semi-matt finish if properly brushed. It is recommended that brushes be regularly degreased.

Choose Brush Carefully

Under no circumstances should low carbon steel brushes be used, as these deposit a finely divided layer of ferritic material on the surface of the material to be welded. This layer rapidly corrodes in contact with the cooling water leaving a layer of rust on the surface which seriously affects the welding characteristics of the material.

Chemical cleaning prior to welding has been tried with some success, but the mechanical method, using stainless steel brushes, is preferred.

Production Quality Control

For adequate quality control, weld test specimens must be prepared by the operator at the commencement, at regular intervals during, and at the completion of the welding operation. The interval at which test specimens should be made should be stipulated by the number of components welded rather than a period of time. They should also be prepared when electrodes are changed. These test

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specimens must be truly representative of the actual welding operation with regard to gauge, disposition of gauges and materials, curvature, surface finish and weld, pitch in the case of spot welding, or weld spacing when seam welding.

Chisel Test Is Good Guide

To meet the requirements of the resistance welding specification, with the "Chisel Test" the following conditions must be fulfilled: (also see photos.)

The nugget should be undistorted due to the expulsion of the metal. In the case of a series of spot welds, the nugget size must be uniform. When seam welding, the individual nugget edges should be examined for uniformity; alternate large and small nuggets indicate that the welding current from each bank of ignitrons is unequal.

This rough and ready test, coupled with a visual examination of the test piece as received for electrode indentation, surface flashes, tip pick-up, expulsion, external cracks, etc. and a periodic examination of an etched specimen gives adequate quality control. Main advantage of the test is the speed with which a specimen can be cleared, thereby entailing minimum delay in production. It has been the custom to allow the operator to proceed on the results of the "Chisel Test" and meanwhile prepare and examine an etched specimen. Finally, to cover all contingencies, 5% of all welds are X-rayed.

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FUNDAMENTALS OF POSITIONING . . .

(Continued from Page 50)

the later stages of assembly where the Weldment becomes an assembly of sub-assemblies. Even in the example of Circular Line Weldment, you see prominently in the Table Top that the ring ends were joined by a straight line weld.

How Weldments Are Classed

As it affects *Positioneering*, however, a weldment is classed according to the weld being made at the time it is positioned. Thus the Trunion Beam and Barrel shown is a Straight Line Weldment when it is being positioned for the welds that join the channels, and is a Circular Line Weldment when it is being positioned for the weld joining the Barrel to the Beam.

The positioner required might well be different for each class weldment, and still different, again, when required to position for both classes of weldments. A Positioner that will function equally well and satisfactorily for Circular Line and Straight Line Weldments is a truly universal machine and often the better buy.

INTERMITTENT Weld (some say Skip Weld) example shown in the Table Top, or Continuous Weld (all other examples) further divides weldment classification, and has a definite effect on choice of positioning equipment. For instance, an Intermittent Circular Line Weldment would need a positioner capable of frequent starts and stops.

Next month the author discusses and illustrates various weldment shapes and explains how weight of weldment and fixture weight affect Positioneering. Center of gravity and its relationship to positioned welding is also covered.

"When welding cast iron, I call for the Airco 77 Electrode"

The deposit of the Airco 77 Electrode is of higher tensile strength than cast iron. It is excellent when machinability of the deposit is not required. The weld metal bonds well, and since it can be applied with comparatively low currents, the hard areas at the fusion zone are materially reduced in cross section. Some applications for the Airco 77 electrode are welding of cylinder blocks and heads, machine parts and large frames.

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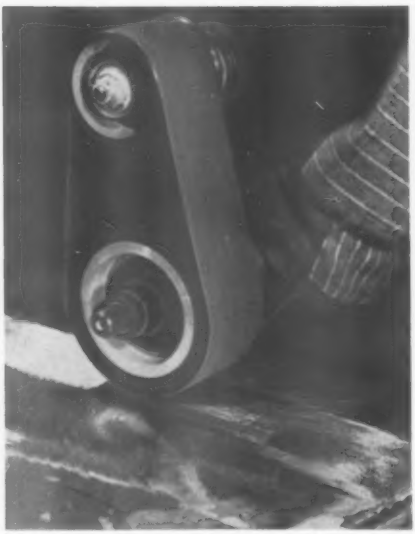
Stainless steel weld is rough ground flush with surrounding surface. Reinforced, depressed center wheel and portable electric grinder are used.



Fine finish is produced with contact wheel-type portable belt grinder which polishes stainless steel weld prior to final buffing operation.

Tips on Grinding and Buffing

By JOSEPH J. SABER
Abrasive Engineer

FINISHING of stainless steel welds may be divided into three general operations; rough grinding, polishing and blending and buffing.

In the rough grinding operation excess rod metal is removed by use of approximately a 24 grit rubber—or resinoid-bonded portable grinding wheel. The wheels commonly used range in diameter from 4 to 8 inches and are operated at speeds of 9500 surface feet per minute. Wheel types commonly used are the plain Type I wheel for curved surfaces and general work, and Type II flaring cup wheels for grinding angles and corners as well as flat areas. Type II wheels because of their design are effective in minimizing gouging or scratching of the flat metal surfaces adjoining the weld.

Slots in channels may be cleaned by using thin rubber-bonded wheels, while mounted wheels and points may be employed to grind otherwise inaccessible areas. In both cases rigid wheels are used for the rough and semi-finish grinding operations and resilient-type wheels for polishing and blending.

In grinding welds the wheel is moved in a continuous motion par-

Scratch-free mirror-like finish is obtained with buffing wheel. Made of muslin sections, buff picks up polishing grains from prepared grease stick.

Stainless Welds

allel to the bead rather than across it. The bead should be smoothed but not entirely removed. A small amount of stock should be left for removal in polishing without producing a groove along the weld when the finish is finally blended with that of the parent metal.

Following the rough grinding operation, the weld may be semi-finished before the final operations with a Type I reinforced wheel in 54 grit. The harder grades are used for the rougher applications with softer grades used to produce finer finishes. Set up polishing wheels employing loose grain or contact wheel type portable belt grinder are used in this and subsequent operations in grit size sequences previously determined by experimentation.

These grit size sequences may be in the order of 36, 60, and 120 or 54, 80 and 150. The last grit size used should be fine enough to match the

How to Finish Stainless Welds

1. Keep work as cool as possible. Don't try to shorten finish time by increasing wheel pressure, this will overheat and tint the metal.

2. Always break in a fresh abrasive wheel or belt on scrap material similar to that on which the abrasive will be used. Such broken-in abrasives are essential when making grit comparisons to match a finish.

3. Clean the surface of the metal thoroughly when changing grit sizes to prevent mixing of grits.

4. Do not attempt to remove too much metal with a fine abrasive. Use coarsest grit size possible consistent with finish.

5. Remember that fine grit will remove more stock from a surface roughened with coarse grinding than from a smooth surface.

6. Keep abrasive scratches straight and parallel. Herringbone scratches, gouges and chatter marks can be avoided by proper technique.

7. Avoid overpolishing in spots and lift the wheel from the work before reversing the direction of the stroke.

finish of the parent metal.

In polishing, strokes always should be made in the same direction as the original polishing lines on the surrounding metal.

Buffing of stainless steels creates highly lustrous and reflective finishes not obtainable by polishing procedures. To obtain these scratch-free, mirror-like finishes, the surface to be buffed must be free of defects and deep scratches.

Muslin buff sections built up to the required width are used for buffing. These may be the same as the type of wheels used with loose grain for the polishing operation. However, in buffing there is no bonding of abrasive as in grinding and polishing. The fine abrasive or polishing media is commercially prepared with a binder such as grease and applied from time to time by holding the stick or cake of compound against the wheel face while it is in motion.

So many factors determine the final finish that the technique of the operator is of major importance. Some of these factors are:

1: Resilience or hardness of the polishing wheel. A specific grit size in a soft wheel will give a different scratch from the same grit size in a hard wheel.

2: Wheel speed. The surface speed at which the abrasive contacts the work influences the cutting action of the abrasive.

3: Condition of abrasive. Fresh and worn abrasive wheels and belts give different results. For example, a used 120 grit abrasive may produce a finish comparable to a new 150 grit.

4: Type of machine. Portable tools will give results different from those obtained with the use of stationary equipment.

These factors which influence finish indicate why it is difficult under shop practice to exactly duplicate a finish on a weld bead with a mill finish. To eliminate all evidence of welding it is necessary to raise the finish of the entire assembly and finish with fine grit coated abrasives. Many jobs finished this way defy detection of the weld.

Mr. Saber is with Carborundum Co.

Stainless steel pipe weld is rough ground using reinforced wheel which is moved in continuous motion parallel to bead rather than across it.

Inaccessible joints and grooves are readily reached with mounted points and small mounted wheels.

AUTOMATIC TORCHES

THE HEART OF ECONOMY

Approved by Underwriters' Laboratories

BY ACTUAL COMPARISON

USING NON-AUTOMATIC TORCH . . . . . 12 Pieces Welded
USING NON-AUTOMATIC WITH GAS SAVER . . 18 Pieces Welded
USING HARRIS AUTOMATIC TORCH . . . . 28 Pieces Welded

Using the same amount of Oxygen and Acetylene for each set-up, this "Actual Comparison" Demonstration proved the Harris Automatic Torch to be a profitable investment for economical and efficient welding work.

Let our local Distributor show you the "Actual Comparison" test in your plant and explain quickly and simply why the Harris Automatic has the greater piece production at the lowest cost.

ALMOST 50 YEARS OF "KNOW-HOW"

Harris is the originator of the "Automatic" Torch and with almost 50 years of building "Know-How" behind every torch, the buyers and users get tremendous returns on their torch investment.

Harris' long established Distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

HOME OF AMERICA'S FIRST AND FINEST GAS WELDING AND CUTTING APPARATUS.

THE HARRIS CALORIFIC COMPANY
Cleveland 2, Ohio

HARRIS

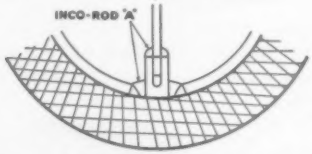
SERVING THE METAL INDUSTRY SINCE 1905

Circle No. 38 on Reader Service Card.

Nick got stuck
...but not Inco-Rod "A"!

First of all, look at that picture! The guy that drew it must think he's a cartoonist or something. *I could have gotten out of that vessel without any help at all!*

Anyway, a coupla weeks ago I dropped out to the plant where these vessels are being produced. The boss weldor—who used to be an old pal of mine — starts right off telling me about them. He drew this sketch to make it easier to see what he was talking about:



The vessel is 3 ft. I.D. by about 30 ft. long. The shell is 302B steel lined with 5% chrome steel. A baffle plate extends the length of the vessel. Two grooved bars hold the baffle plate in position.

'The hitch came,' he says, 'as soon as we tried welding in one of the 5% chrome grooved bars. A Zyglo test showed our weld looking like a fractured eggshell.'

So we tried a triple play

'With Inco-Rod "A"* electrodes, we did some *real* dissimilar alloy welding. We welded a new grooved bar of 405 steel to both the chrome lining *and* the 302 shell. Three different steels in one joint—and not a bit of trouble!

'We don't even preheat like we did for the weld that cracked. Inco-Rod "A" electrodes still give strong, crack-free welds!'

'Well,' I say, '*usually* you don't need preheat when you weld dissimilar alloys with Inco-Rod "A" electrode. But it's smart to check first to determine whether the base material would be benefited by preheat.'

Circle No. 45 on Reader Service Card.

Anyway they *also* use Inco-Rod "A" electrode to weld the 405 baffle plate to the grooved bar. And I crawl into one of the vessels to watch. Well, it was off-season at the racetrack—'cause I'm head to head with a weldor the size of a jockey! And my right arm is stuck behind my back . . .

The vessel passed a tough test!

When I finally get out, this pal of mine acts real grateful. 'Thanks a lot, Nick,' he says. 'What with Goldie's cooking and all the beer you drink, that's one vessel we won't have to pressure-test!'

Like I tell my boss, Inco-Rod "A" electrode is colored my *second* favorite shade of green. (The first being the shade I see on payday.)

It may be a long time before you weld a joint involving three different alloys. But you'll find that Inco-Rod "A" electrode — with the *green* flux coating — gives sound, ductile welds easily on most dissimilar alloy jobs.

Which jobs? The research boys test out new combinations every month. Write me for a folder that tells what Inco-Rod "A" electrode can do. Or, better yet, write and ask me about the *particular* joint you want to weld.

Yours for better welds,

Nick Rodder

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N.Y.
*Trademark of The International Nickel Company, Inc.

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WHICH WELDING PROCESS

(Continued from Page 63)

makes it possible to guide easily and thus speed up the operation. However, since penetration is not as great as with submerged arc welding, more metal must be deposited as a rule — the groove design requirements approaching those for manual welding.

Automatic submerged arc welding makes use of the higher currents available to deposit large volumes of metal in short periods. At 1500 amperes, 45 pounds of metal per arc hour can be deposited, and if deep penetration can be used to advantage, the weld bead is about 1⅛" deep at this current. Again, because of the deep penetration, the metal economy is good and welding speeds are high. The duty cycle on this type of work is often low since other operations may govern the work cycle and values of 20-30% are not uncommon.

Overhead Costs

The usual practice in computing general overhead charges is to rate it against the labor charges. Time savings which may be effected by a process are multiplied by the labor rate and the overhead rate. This can be very significant when overhead rates are high and can affect the choice of a process. For instance, if Plant 'A' is operating with an overhead of say 50%, the high material costs of inert gas welding might offset the savings in labor and overhead. On the other hand, Plant 'B' with 150% overhead might use the same process at a considerable saving since the labor and overhead saving might easily outshadow the increased material cost.

Typical Evaluation

The butt welding of a 5-foot

diameter circumferential seam in a 1½" thick pressure vessel is used as an example of the method of evaluating and choosing a process.

The initial equipment cost is not considered here. Equipment maintenance cost, however, must be taken into account. For manual welding this is negligible but for submerged arc welding a figure of 3% of labor time is not unreasonable, and for inert gas welding (to date) 5% of labor time can be used as an average figure.

The cost of welding material is affected by groove design, with the greatest economy being shown for automatic submerged arc.

In preparation costs, the manual, submerged multipass and inert gas grooves are considered to be flame cut while the two-pass submerged arc groove is machined. With manual metallic arc and multipass submerged arc the costs of back-gouging for welding the second side are also included. This is not considered in the two-pass submerged arc or the inert gas method.

power -when and where and in the EXACT amount you need!
10-190 amp 110-220 v
That's the capsule story of 190-A—one of scores of precision welders—both arc and spot—from the forward looking engineering of BIRDSELL. More power per dollar of investment—more power per handy pound. Invest some time—call your dealer for a demonstration of welders, sensational in concept—unheard of in performance!
BIRDSELL PRODUCTS
PALO ALTO CALIF.
STEPLESS AMPERAGE CONTROL

Circle No. 17 on Reader Service Card.

Circle No. 22 on Reader Service Card.

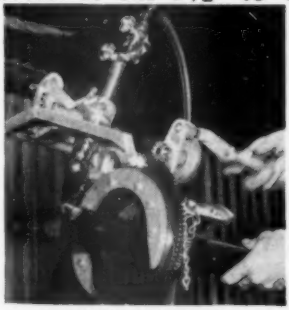
In direct welding labor costs the manual welding includes all normal delays, using E-6020 electrodes (net 3.4 #/hr. deposit). Multipass submerged arc and inert gas are both considered at 50% duty cycle while the two-pass submerged arc was calculated at 30% duty cycle with two men on the machine.

Two overhead rates (50% and 150% of all labor charges) are used to show their effect on the total cost. As pointed out previously, the effect of overhead is most noticeable in changing the relative costs of processes when a large differential in material costs is apparent as between manual and inert gas welding.

The foregoing has covered in general, the factors which must be considered when choosing a welding process. Each industry must evaluate its own factors. Plants using mass production methods can place emphasis on equipment in order to derive a maximum saving in labor time, while the custom or job-shop usually chooses more flexible processes which are easily adaptable to many types of work.

Circle No. 64 on Reader Service Card.

H&M announces the MODEL "O" — a pipe Beveler to cut 1½" to 4"!



PATENT APPLIED FOR

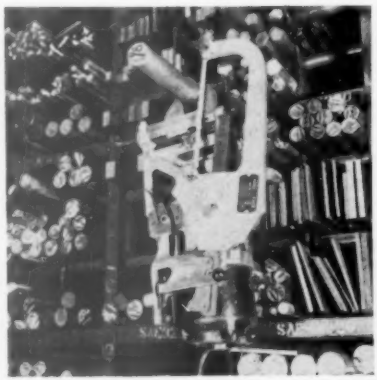
PERFECT BEVELS — COMPLETELY PORTABLE!

(*Weight: 7½ lbs.*)

With the same split-gear horseshoe principle as H&M's larger models, the Model "O" offers the maximum in speed and quality of bevels on small diameter pipe! Rugged and dependable, H&M's Model "O" is easily operated by unskilled operators, and changing from one size pipe to another is a matter of seconds! Write immediately for fully illustrated brochure!

H&M PIPE BEVELING MACHINE COMPANY

TM REG. 311 E. Third St. Tulsa, Oklahoma Diamond 3-0241



EVER HAVE TO DO THIS?

HAND-I-HACK is truly handy.

Cuts in any position.

(A power operated saw)

Only $195.00 Only 45 lbs.

WALLACE SUPPLIES MFG. CO.

1312 Diversey Parkway • Chicago 14, Illinois

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JOHN J. CHYLE HEADS AWS for 1956-'57

JOHN J. CHYLE

JOHN J. Chyle, Milwaukee, Wisconsin, has been elected president of the American Welding Society for 1956-1957. Mr. Chyle, director of welding research, A. O. Smith Corporation, succeeds Joseph H. Humberstone as president. Mr. Chyle has long been active in the affairs of the Welding Society, and is well known in the welding industry. He will direct the activities of more than 11,000 members.

Mr. Chyle graduated in chemical engineering from the University of Wisconsin in 1924. After working for a short period at Smith Steel Foundry, Milwaukee, he joined the A. O. Smith Corp. as a chemist in the Production Laboratory. In 1926, he was named head of welding electrode research and, in 1937, he was appointed director of welding research. Mr. Chyle has invented and patented a number of welding electrodes and welding processes. Many welding processes originated under his direction, including those for the welding of low-alloy high-tensile steels, and he also participated in the work essential to the production of the first atomic bomb.

First vice president will be Clarence P. Sander, general superintendent, Vernon Plant, Consolidated Western Steel Div., United States Steel Company, and known for his service to the Society as officer and director for many years.

Mr. Sander is a graduate of Wilson College, Seattle, Wash., with post-graduate work in engineering at the University of Washington and the University of Southern

California. He was formerly with the Pacific Car & Foundry Co. In 1934, he joined the Western Pipe and Steel Company as General Superintendent of shop and field operations, until it became a part of Consolidated Western Steel. His experience in welding covers a broad field such as railroad equipment, shipbuilding, pipe line, pressure vessels, steel structures and various other welded products.

Gustav O. Hoglund, head of the Welding Section, Alcoa Process Development Laboratory, Aluminum Company of America is newly elected to the office of second vice president.

Mr. Hoglund graduated from the University of Michigan in 1925 with a degree of Bachelor of Science. He is well known for his work in the welding of aluminum, having developed many of the early techniques and procedures for arc and resistance welding of this metal. He also holds several brazing patents in this field.

Newly elected directors-at-large are John H. Blankenbuehler, design engineer, Hobart Brothers Company; George E. Linnert, charge of welding research, Armco Steel Corporation; Gordon Parks, chief welding engineer, Solar Aircraft Company; Francis H. Stevenson, production engineer, Aerojet-General Corporation.

DIRECTORS-AT-LARGE

J. BLANKENBUEHLER

G. E. LINNERT

G. PARKS

F. H. STEVENSON

VICE-PRESIDENTS

C. P. SANDER

G. O. HOGLUND

The following district directors were elected: Middle Eastern District—Donald B. Howard, supervisor of metallurgy and welding, American Car and Foundry Division of ACF Industries, Inc.; Southeast District — Thomas R. Berg, registered inspector, J. Calvin Jureit & Associates; Central District—Keith Sheren, sales engineer, Taylor-Thompson Machinery Co.; Midwest District — Frank G. Singleton, owner, Singleton Welding Supply Co.; Western District — Charles L. Breese, president, John Tillman & Company.

Good fit-up, proper wire and high purity carbon dioxide are three things you need in . . .

CO_2 Welding of Mild Steel

by K. V. NICKELL

SINCE the earliest days of long distance highway motor transportation, Snyder Tank Corporation of Buffalo, N.Y., and Birmingham, Ala., has been producing engineered truck fuel tanks to meet every need of the trucking industry.

As trucking companies have lengthened their runs, stepped up their schedules, and increased overall weight and size of their commercial vehicles, Snyder has kept pace by making available new tanks of improved design and increased capacity.

Aiding this company have been the various improvements in recent years in welding processes and methods. The latest improvement —use of straight carbon dioxide (CO_2) for shielding — is currently making possible high speed machine welding of mild steel parts at a lower cost.

Developed for commercial use within the past few years, though only now beginning to be used by industry on a wide-scale basis, CO_2

MANHATTAN MOLDISCS

For Safer, Faster Cutting or Grinding

Every turn of a Manhattan Moldisc exposes a fresh, sharp abrasive surface to speed roughing and finishing operations on weldments, castings and forgings. The fast cutting surface remains right down to the last useable part of the wheel — without loading or glazing! That's because the Manhattan Moldisc you use is custom-made for your particular type of work in mild steels, stainless alloys, aluminum or copper. Manhattan Moldiscs are safer to use because they're light in weight, easier to control and reinforced with special super-strength synthetic fabric to prevent breakage. They last longer, too. Actual tests have proved they are the most economical portable grinding wheels you can use on right angle grinders.

Available types range from harder, stiffer bonds for fast roughing to accurately flexible and resilient bonds for fine finishing. Whatever your job requirements, there's a Manhattan Moldisc to remove metal faster and safer throughout the long life of the wheel. Let a Manhattan representative show you how Manhattan Moldiscs — and other types of Manhattan high speed, heavy duty wheels — give you "More Use per Dollar". RM-634

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

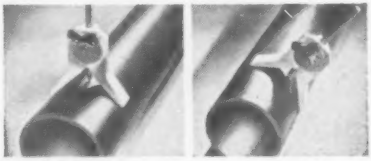
MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

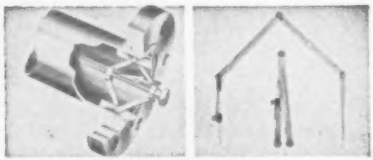
Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 73 on Reader Service Card.

LAYOUT PIPE JOINTS (Ys, Ts, Ls or any angle joint) in minutes with the Contour Marker on any size pipe from 1½" to 48". Absolutely accurate. Two sizes: Standard for 1½" to 18" pipe; Jumbo for 16" to 48" pipe.



MARK A CENTER LINE at any angle on a pipe, with Boyce Centering Head. Leveling gauge on dial protractor establishes angle; hardened punch marks it.



ALIGN PIPE AND FLANGE (slip on, lap joint, stub-end & welding neck) with this expanding tool.

MARK ANY ARC or circle up to 48" with this folding, all metal 24" Radius Marker.

CONTOUR MARKER CORP.
of California

1843 East Compton Blvd., Compton, California

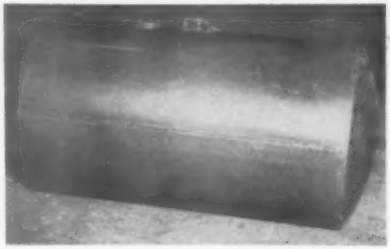
SOLD BY WELDING SUPPLY DEALERS

Circle No. 24 on Reader Service Card.

shielding is designed for high production applications on mild steel where use of argon or helium shielding is not always economically feasible.

At its Birmingham plant, Snyder is using CO_2 in conjunction with consumable electrode gas shielded metal arc welding. The set up is easily changed to permit welding the various size tanks manufactured because of the same automatic process involved.

Tanks are welded at a speed of 45 ipm. Straight CO_2 gas and .045-inch diameter welding wire are used. Shielding gas flow is approximately 35 cfh. Seams are lapped



Mild steel fuel tanks are CO_2 welded at 45 ipm, using 35 cfh of straight carbon dioxide shielding gas and .045-inch diameter wire.

and tacking is done with conventional coated electrodes, which are also used for tank fittings.

In welding the CO_2 gas as a shield, Snyder has found that high purity carbon dioxide is essential.

Vital, too, is the quality of the wire used. For sound welds, wire must have sufficient quantities of manganese and silicon to overcome the oxidizing effects of the gas.

Proper fixtures are also important. For successful CO_2 welding, fit-up must be as good if not better than for other types of welding.

Mr. Nickell is sales representative for Air Reduction Sales Co. in Birmingham, Ala.

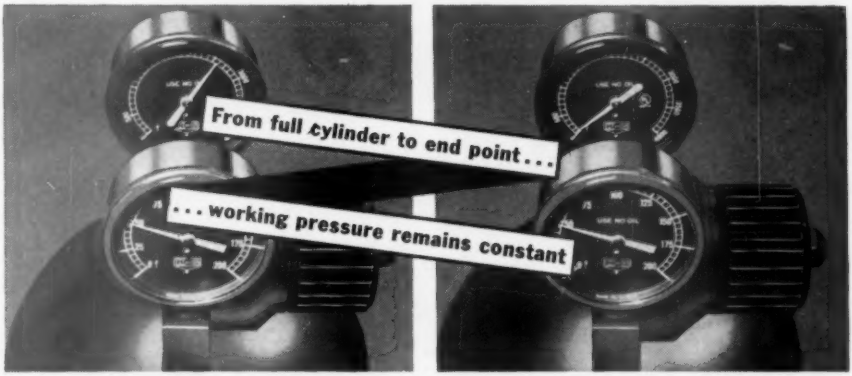
American Welding & Mfg. Promotes Metallurgists

The American Welding & Manufacturing Co., has announced the promotion of two metallurgists Forrest W. Johnson and Gordon W. Reeder, to positions of greater responsibility.

Mr. Johnson has been named quality supervisor, and he moves into a position previously held by R. E. Goodman, who was promoted recently to superintendent, Finishing Operations. He joined the company in 1951 as a metallurgist and in 1955 was promoted to plant metallurgist.

Mr. Reeder, the new plant metallurgist, joined American Welding in 1954, as a metallurgical engineer.

New K-G Single Stage Regulators Out-perform All Others!



- First major development in regulators in 20 years
- Great sensitivity—equal the performance of many 2-stage regulators
- Take apart, re-assemble in 3 minutes—without special tools!
- Slash down-time, maintenance costs . . . increase service life

Entirely new, simplified design! Bodies and bonnets anodized aluminum alloy forgings . . . stronger, lighter, more corrosion-resistant. New sintered stainless steel filter practically eliminates seat failure. Adjusting mechanism rides on ball bearings for smooth, accurate control—is *fully enclosed* for complete protection against damage or loss. New single stage models—1200 Series—for practically all compressed gases. New two stage models—1100 Series—for the *ultimate* in performance! *The K-G Equipment Co., Inc., Dept. B , 1744 Lehigh St., Allentown, Pa.*

Ask Your K-G Distributor for a Demonstration—Send for 24-page K-G Catalog

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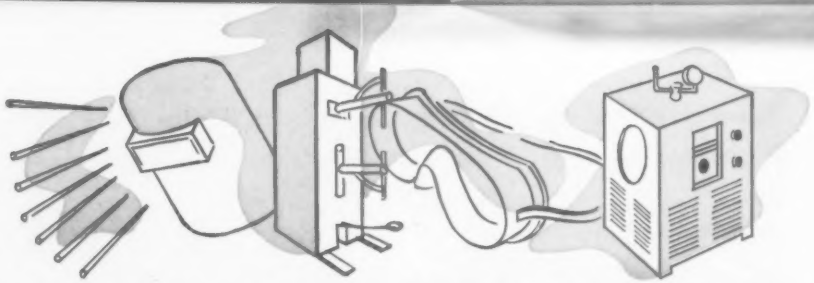
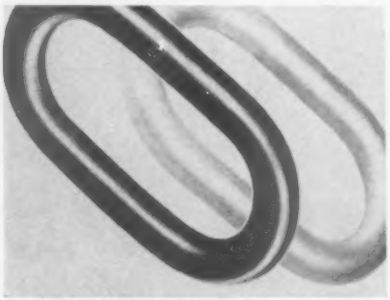


NEW PRODUCTS

Shaped Section Master Link

Designated the Shaped Section Master Link, this device for use with industrial slings is said to hold its form under 18 percent greater loads and stresses. Made by American Chain Division, American



Chain & Cable Co., Inc., master link provides greater safety to men, machines and materials.

Made of a high strength steel alloy, Accoloy, components are produced in sizes from ½-inch to 1¾-inches. They are available as components of American Chain slings, also separately for use with any make of chain or wire rope sling.

Circle No. 133 on Reader Service Card.

Improved Vertical Grinder

A new and more powerful air grinder

designed by Thor Power Tool Company has recently been perfected and is now in production.

Completely redesigned, from its one-piece housing to a newly developed air motor, the grinder has been designated the Model 5V. It is available in speeds of 4500, 6000, and 8000 rpm and features an adjustable governor which is said to increase air economy and assure complete safety under operating conditions.

Thor emphasizes an additional design feature, grip handles which are spaced 110° apart rather than the conventional 90°. Thor engineers believe that this change will heighten operator convenience and hence increase efficiency.

Circle No. 135 on Reader Service Card.

DC Rectifier Welder

New DC Bumblebee arc welder introduced by Air Reduction Sales Co. has improved solenium rectifiers.

New low design permits stacking for parallel operations; weather-proof construction for outdoor operation. Patented transformer design produces instantaneous voltage recovery and control resulting in easy-to-handle arc. Forced draft ventilation assures low operating temperature.

Unit is available in 200, 300 and 400 ampere models.

Circle No. 134 on Reader Service Card.

over 1,000

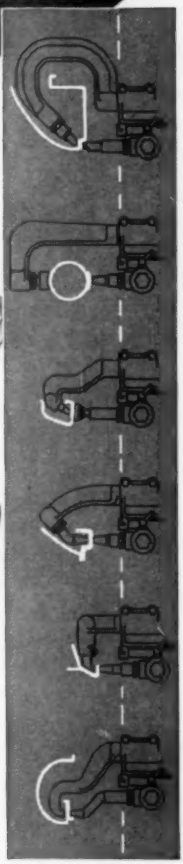
SPECIALIZED WELDING GUNS FROM ONE STANDARDIZED PROGRESSIVE MODEL

PROGRESSIVE'S EXCLUSIVE NYLON GUIDE

- Constant guide and support throughout stroke
- Resists weld spatter
- Self-insulating
- No lubrication required

Progressive's Standardized Gun Chassis combined with standard, interchangeable cylinders, jaw extensions, electrode adapters and tips give you job-specialized portable welding guns at a fraction of the cost of special designed guns.

Progressive has more portable guns in use than all other manufacturers combined. For information on any type of Special or Standard Portable Gun —write to Progressive in care of Department G.



Group of special jaw designs demonstrating wide versatility of Progressive Welding Guns.

IT PAYS TO WELD

PROGRESSIVE Welder Sales Co.

915 Oakland Avenue • Pontiac, Michigan

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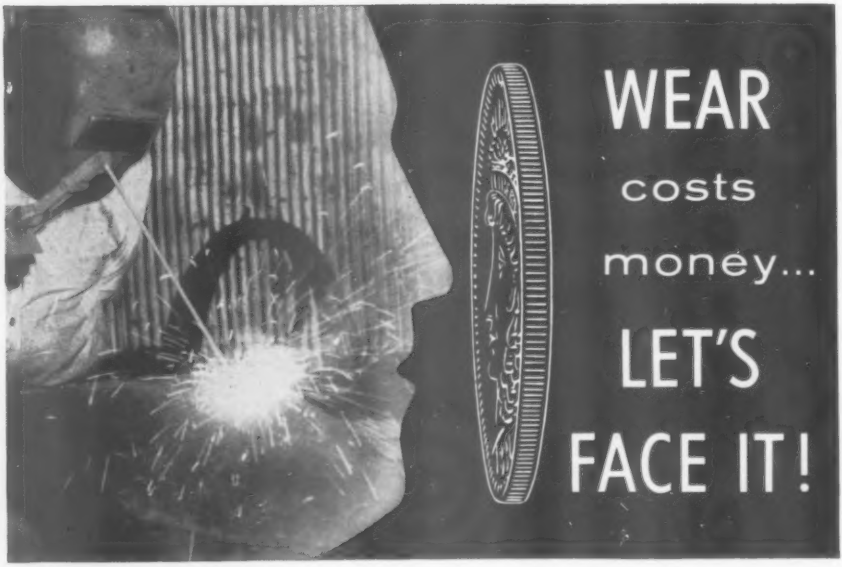


AMSCO® HARDFACING ROD

Amsco's complete line of hardfacing rod is a selection of the toughest, hardest alloys available for the reduction of industrial wear. Among the alloying metals used are manganese, chromium, nickel, cobalt, tungsten and molybdenum—all highly wear-resistant, each having its own particular resistance to impact, abrasion, heat or corrosion.

We have many helpful methods for selecting the proper hardfacing rod to most effectively combat the types of wear you encounter every day. Why not make us your hardfacing headquarters?

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

Circle No. 9 on Reader Service Card.

Small-Diameter Pipe Cutter

Introduction of a completely portable flame cutting and pipe beveling machine for pipe 1½ to 4-inches in diameter has been announced by H & M Pipe Beveling Machine Co. The new Model "O" is completely portable (weight: 7½ lbs.) and assures perfect, square bevels under all conditions.

Employing same split-gear horseshoe principle used in company's larger units (for pipe up to 36-inches), the new, smaller model allows operator to place machine on continuous pieces of pipe. Quick-operating, specially designed boomer strap speeds up changing machine from one piece of pipe to another.

Circle No. 42 on Reader Service Card.

USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

Industrial Vacuum Cleaner

A new vacuum cleaner that features light weight, mobility and power has been announced by Black & Decker Mfg. Co. The No. 65 heavy-duty unit is equipped with its own specially-designed universal motor. Sealed against dirt and water, the 1½ hp motor has enormous cleaning power and can remove rapidly up to 3¾ gallons liquid or ⅞ bushels dry material before emptying is necessary.

Unit has two large 8-inch rubber wheels and a caster in front which permit easy rolling as well as stability when moving over rough floors.

Cleaner can be converted to blower by changing hose connections. Standard attachments include a hose swivel, 6-inch nozzle, 6-inch brush, and crevice tool.

Circle No. 137 on Reader Service Card.

Iron Powder Electrode

"Rocket 14" is Hobart's newest iron powder-type electrode and is designed for A-C or D-C operation in all positions. Iron powder in the coating permits welding at higher currents to increase deposition rates over conventional E6014 electrodes.

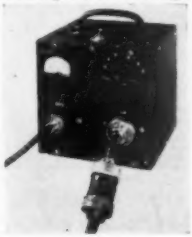
Arc is soft and stable in all positions and there is said to be no tendency to stick on either A-C or D-C. Contour of weld is easily controlled by arc length. Weld bead is smooth, slag is easily removed and there is very little spatter.

Made by Hobart Bros. Co., new electrode comes in six diameters.

Circle No. 138 on Reader Service Card.

Portable Voltage Booster

A portable electric power unit, the Portopower voltage booster introduced by Portopower Division delivers additional voltage required so often in construction work. Unit is equipped with a voltage meter for checking delivered operating power, a 5-position voltage increase switch, each position providing a 10-volt step-up in voltage output (total increase available: 50 volts).



Unit can be attached to replace voltage lost in operation of portable power tools through use of an extension cord, from service drop to point of operation. Under same conditions, voltage booster can also be used to step up operating speeds.

Circle No. 139 on Reader Service Card.

Multi-Use Gas Heating Tips

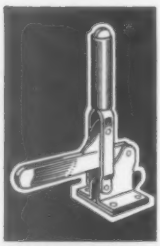
A gas heating tip manufactured by The American Torch Tip Company has recently appeared on the market. It features interchangeability and is said to be adaptable for use with any cutting torch. The company recommends it for use in localized heating operations where high heat output is required, and has designed one series for use with acetylene as the fuel gas, and another series for use with natural gas.

The heating tips make use of a patented torch adapter. Thirty-six standard size tips fit this one adapter and thus add to the versatility of the unit.

Circle No. 140 on Reader Service Card.

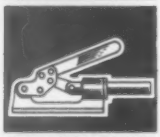
WESPO

TOGGLE CLAMPS



Hardened steel bushings and pins provide for longer wear — eliminate elongated holes and pin shearing.

A CLAMP FOR EVERY WORK HOLDING NEED

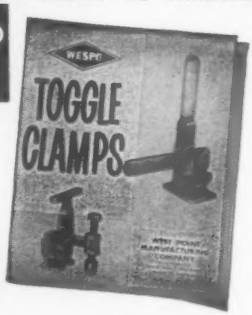


37 Sizes Available

WESPO TOGGLE CLAMPS are engineered and constructed for positive holding and light, medium and heavy clamping.

West Point Mfg. Co.
26941 W. SEVEN MILE RD.
DETROIT 19, MICHIGAN

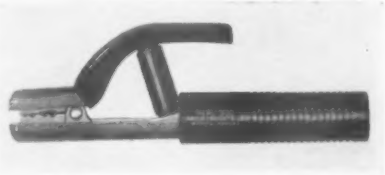
WRITE for FREE BULLETIN



Circle No. 90 on Reader Service Card.

Lightweight Electrode Holder

A new, lightweight electrode holder introduced by Tweco Products, Inc., has a body and upper lever made of high conductivity aluminum forgings. Called the No. AL-300, holder weighs just 13½ ounces. Forging of metal parts gives holder high tensile strength and increases conductivity to a point where it surpasses copper castings.



Welding cable is easily attached to holder by baring cable and inserting it in reamed hole in holder body. One large ball point allen screw holds cable securely in place.

Jaws and body are insulated with patented insulation which is made from many layers of glass cloth bonded together with pure Melamine Resin.

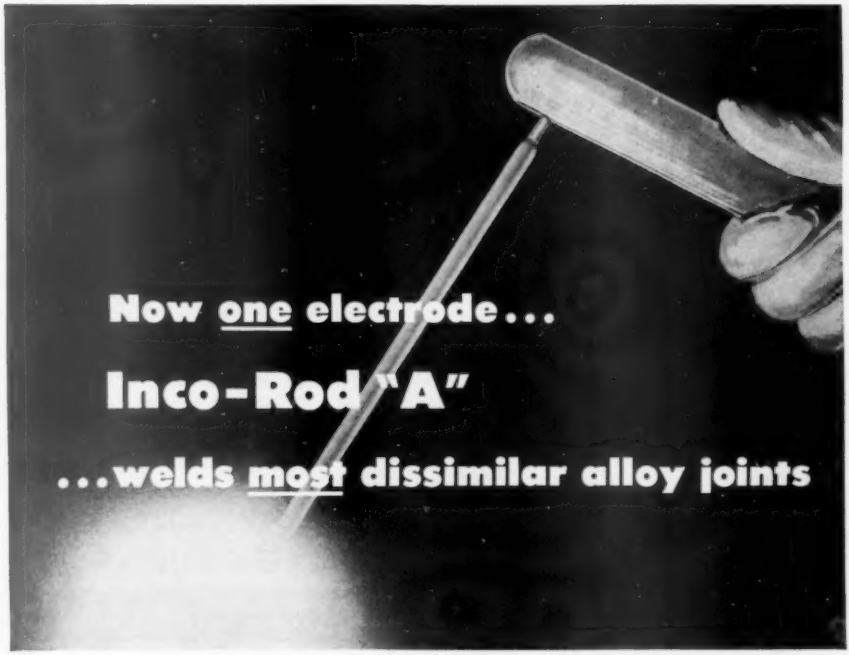
Circle No. 144 on Reader Service Card.

800-Amp Rectifier

A new 800-amp rectifier welder for gas-shielded, consumable electrode welding has been announced by General Electric Co. Available in three models, new welder features quiet operation, a combination cleaning-cooling fan, easily removable side covers and Class H silicone insulation. According to company engineers, an infinite number of welding voltages within the unit's rating will suit any condition of gas, and size and speed of wire.

All three models are rated at 800-ampere output, 15 to 40 volts continuous; 95 percent power factor; 78 percent efficiency; and 41-kilowatt input.

Circle No. 142 on Reader Service Card.



Versatile—Dependable

INCO-ROD "A" electrode fills a long-felt need.

It joins many combinations of dissimilar alloys.

Use INCO-ROD "A" electrode to weld mild steel to 304, for example. Or 405 to 304. Or Monel* nickel-copper alloy to 410. Or 347 to Inconel* nickel-chromium alloy.

With each combination, the weld is strong and ductile . . . of X-ray quality. Corrosion resistance and mechanical properties usually equal or exceed those of the base metal. What's more, operability is excellent in any position, spray type arc, good slag removal.

*Trade Mark of The International Nickel Company, Inc.

Four convenient sizes handily packed. INCO-ROD "A" electrode is supplied in 14-inch lengths in four diameters, 3/32-, 1/8-, 5/32- and 3/16-inch (the 3/32-inch is center grip) packed in 5-lb., tubular, asphalt-lined, protective containers (NEMA color coded).

More than thirty such combinations have been welded successfully with INCO-ROD "A" electrode. Industry is trying many other combinations . . . both between and among ferritic and austenitic stainless steels, low alloy steels, mild steels, high nickel alloys, and other types of alloys.

Better than 90% of all such jobs can be handled with this one versatile, new electrode . . . INCO-ROD "A". . . the one with the *green* flux coating.

For welding data on *proven* combinations between common alloys, write for 'Announcing INCO-ROD "A"' . . . a new Inco folder. Be sure, too, to ask about alloys *you* commonly join. New data, not yet published, is constantly coming in from the field.

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Welding Products**
electrodes • wires • fluxes

Circle No. 46 on Reader Service Card.

Tempilstik°

FOR ALL HEAT-DEPENDENT OPERATIONS

looks like a crayon... marks like a crayon... tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

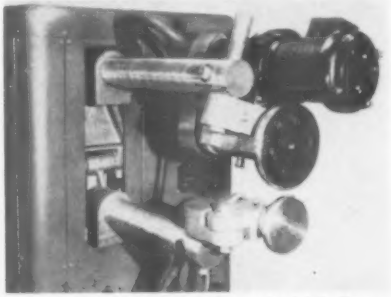
ALSO AVAILABLE IN LIQUID AND PELLET FORM... WRITE SALES DEPT. FOR SAMPLE TEMPIL° PELLETS... STATE TEMPERATURES OF INTEREST—PLEASE!

Tempil°
CORPORATION
132 WEST 22ND STREET
NEW YORK 11, N. Y.

Circle No. 81 on Reader Service Card.

Motorized Seam Welding Head

Both circumferential and longitudinal seams can be made with a new motorized seam welding head developed in



England by Meritus (Barnet) Ltd. Overlapped or spaced welds can be obtained as required by suitable adjustment of controls. Unit is attached directly to spot welding head.

Three speeed ratios are provided and it is possible to produce a continuously welded seam in mild steel at 45 inches per minute.

Circle No. 143 on Reader Service Card.

USE THE READER SERVICE CARD FOR VALUABLE REFERENCE DATA

Gyrating Flux Screen

Introduction of a gyrating flux screen to screen flux for automatic submerged arc welders is announced by Simplicity Engineering Co. Unit removes scrap and fused flux from usable flux which is

discharged into the boot of a bucket elevator and returned to the welder.

Flux screens have balanced mechanical action which concentrates vibration on screen deck and transmits little or no vibration to welding machine. Units are available in sizes 10 x 30-inches and 10 x 50-inches. They can be designed to fit various types of automatic welders.

Circle No. 141 on Reader Service Card.

MR. BUYER OF ELECTRODE HOLDERS

Let's Get Down To Facts On Just What You Get For The Money You Pay For'em

SIMPLY CHECK THESE QUESTIONS . . . AND YOU'LL HAVE THE ANSWERS!

- Do the Holders you buy have Wrap-around Glass Fiber Insulation for 30% **more** heat resistance than any other make?
- Do they have the safety value of Brilliant Red Glass Fiber Tips and Trigger with bright yellow Glass Fiber Handle for instant identification anywhere in plant?
- Are the Tip Insulators made from high impact Glass Fiber with top and bottom interchangeable to reduce stock requirements and maintenance costs?
- Is the body of the Electrode Holder completely insulated, or is there a bare spot between spring and trigger?
- Do their handles prevent moisture absorption and warping, as well as insulate glove from holder heat?
- Do they have high conductivity copper in lower tong to carry away inducted heat from rod, as well as high electrical conductivity?

AND NOW AS TO OUR PRICES—SEE WHAT YOU CAN SAVE!

HI-AMP Model	Rated Amperage	Rod Size	Wt.	Lots 1-5	Lots 6-11	Lots 12-49	Lots 50-99	Lots 100-249	Lots 250-Up
F-2	200	5/32" to 1/4"	12 oz.	4.50	4.05	3.85	3.65	3.45	3.30
F-25	250	1/4" to 1/4"	14 oz.	5.50	4.95	4.70	4.45	4.25	4.05
F-3	300	5/16" to 3/32"	21 oz.	6.00	5.40	5.15	4.90	4.65	4.40
PI-5	500	5/16" to 3/32"	26 oz.	7.50	6.75	6.40	6.10	5.80	5.50

Insist on your Welding Supply House showing you the Wagner Hi-AMP line of Welding Accessories. If he does not carry them in stock, write for descriptive literature and name of distributor nearest you.

Sold only through Welding Supply Distributors throughout the U.S. and Canada.

WAGNER Manufacturing Co. Inc., Jackson, Mo.

Circle No. 92 on Reader Service Card.

Weld with Wagner

WELD PREPARATION WITH THE Arcair® TORCH

SAVES TIME and MONEY

● **SAVINGS in fabrication costs** up to 50% have been reported by users of the Arc-air Torch for weld preparation. The usual Arc-air procedure is to butt unbeveled plates together and either tack weld or run a sealing bead along one side of the seam. The joint is then gouged from the opposite side, usually with one pass of the Arcair torch, leaving a clean even groove ready for welding. On heavy plates the backside is then gouged to sound metal and welded.

EASE OF FITTING as well as elimination of burning slab operations with necessary extra handling — plus the fact that both plates are prepared by a single pass of the Arcair Torch which is economical to operate, make this method faster and cheaper than those previously used.

Welding without prebeveling

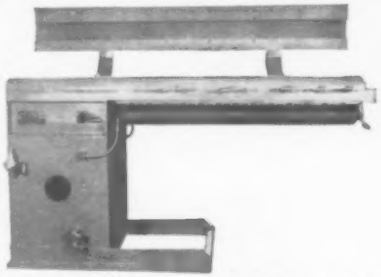
THE NEW L MODEL Automatic Travel Torch, which takes the torch out of the operator's hand and places it on a tractor or in a fixture, is particularly adaptable to this operation. Write for complete information.

ARCAIR COMPANY
429 South Mt. Pleasant Street
LANCASTER, OHIO

Circle No. 13 on Reader Service Card.

Longitudinal Seam Welder

A new longitudinal seam welder has been announced by Reed Equipment Division of Webb Corp. The machine, the Series "G" double-acting seam welder is designed for use with either inert gas or submerged arc welding heads. Designed primarily for light gauge welding of stainless and aluminum alloys, it has proved successful on mild steel and steel alloys up to 10 gauge thickness. Six



standard models are available, ranging in capacity from 24" x 10 ga. up to 84" x 14 ga.

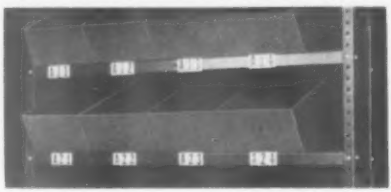
Circular shaped lower horn permits welding of small diameter work. It is equipped with copper or other non-ferrous back-up bar. Back-up bar is water-cooled.

Upper-horn is double-acting type and is designed to permit independent clamping of either side by means of foot-operated air valves.

Circle No. 145 on Reader Service Card.

Self-Sticking Markers

Individual, self-sticking numbers and letters, in six sizes from ½-inch to 5-inches high and mounted on handy dispenser cards, have been developed by W. H. Brady Co. Numbers and letters are stocked and sold in two colors: black on white and black on yellow.

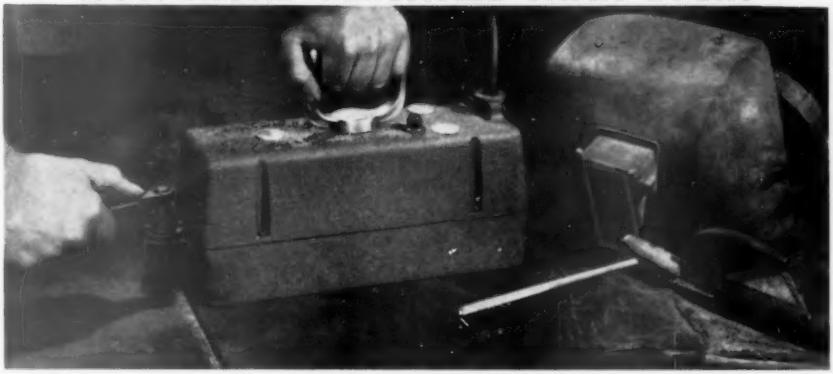


They are made of impregnated cotton cloth with a temperature-resistant pressure-sensitive adhesive and can be mounted on handy dispenser cards which protect adhesive until used. Anyone can apply markers in a matter of seconds to clean, dry surfaces.

Circle No. 146 on Reader Service Card.

Portomag Plate Clamp

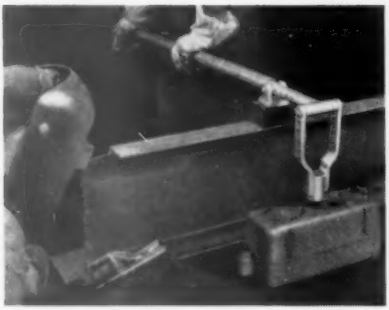
NOW MORE VERSATILE THAN EVER!



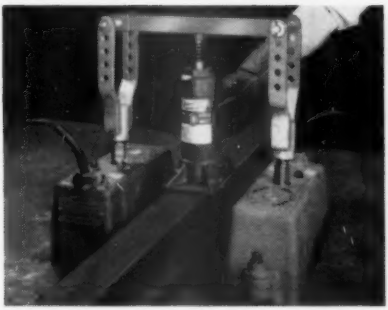
Especially developed for use in the welding industry, the PORTOMAG welding clamp is both unique and versatile. Its heavy duty electro-magnetic base produces a holding power in excess of 3000 lbs. for positive positioning in operation. The simplicity of operation of this new welding tool assures you of better welding time and labor saving conditions and offers advantages for stepped up production with quality welding results.

WELD STIFFENERS TO PLATE STEEL . . .

quickly . . . easily, with new single or dual leverage adapter



SINGLE LEVERAGE ADAPTER . . . designed for semi-heavy duty welding jobs where angle irons, channels, or I-beams are welded to plate steel as stiffeners. Simple leverage action draws the plate flush to the stiffener surface for a perfect weld.



DUAL LEVERAGE ADAPTER . . . for use in heavy duty welding jobs, where large structural steel stiffeners are fabricated to steel plate. Used together with a hydraulic jack, this unique assembly draws together plate steel and I-beam stiffener, for perfect alignment.

Contact us now for an ***"ON THE JOB DEMONSTRATION"***

Portomag, Inc.

1511 E. NINE MILE ROAD
FERNDALE 20, MICH.
LINCOLN 7-0055

Circle No. 71 on Reader Service Card.

MR. WELDING SUPERINTENDENT

Tipaloy

Tipaloy #130* is the answer to users who know the difference between PRICE and COST when it comes to Resistance Welding electrodes.

You want all the welds you can get for the least money.

Insist on TIPALOY "Straight-Line" Tips.

Tipaloy electrodes are precision made from Tipaloy's own patented alloy, assuring you satisfaction.

30% TO 100% LONGER TIP LIFE

Resulting in longer runs without shutdown for maintenance AND more welds per electrode.

Tipaloy Quality is the accepted standard for efficient welding at lower cost. Prove this on your own machines in your own shop. SEND YOUR TRIAL ORDER TODAY.

FREE: Write for your copy of Tipaloy's Comprehensive new catalog.

DISTRIBUTORS & REPRESENTATIVES: Several attractive territories still available. Write for complete information.

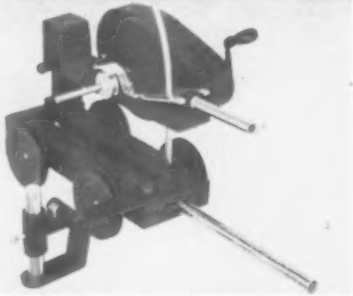
*RWMA Class #2 Alloy

Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

Circle No. 83 on Reader Service Card.

Portable Beveling Machine

A new lightweight all-purpose beveling machine, tentatively known as the Contour Marker Bevel-rite, has just come on the market. Unit weighs only 33½ pounds, is ruggedly built and will handle pipe from 2 to 24-inches in di-



ameter. Bevel-rite can be set to roll pipe while cutting or, if pipe is fixed, machine will move around the pipe. It also handles plates.

Unit comes furnished with complete equipment for cutting all sizes of pipe and plate within its range. Operating mechanisms are housed for full weather protection.

Circle No. 147 on Reader Service Card.

Reinforced Grinding Wheels

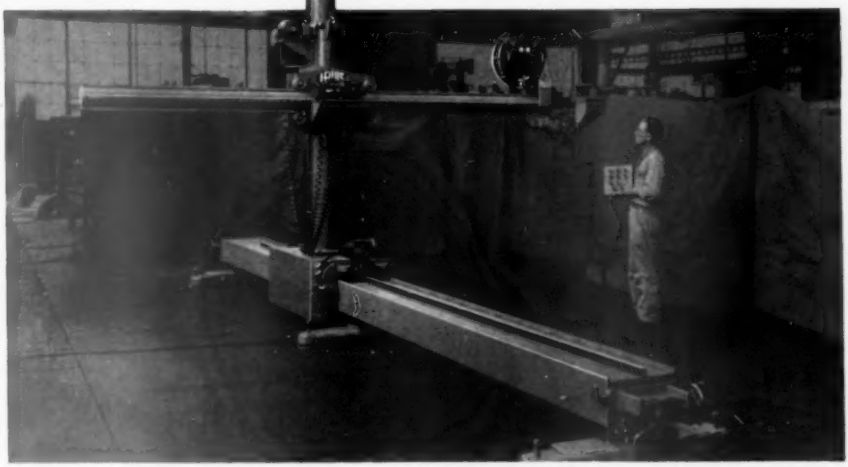
A new development of Metal Removal Co. is the Saftex reinforced grinding wheel which offers a regular hard resin wheel in thinner sections of 1/8, 3/16, ¼ and 3/8-inch thicknesses. Wheels are reinforced to take great peripheral, as

well as side bending or wedging stresses.

Saftex straight wheels are used for same applications as straight resinoid or rubber wheels, but are said to give greater safety where jamming, wedging, taper cutting, notching or portable cut-off work create a hazard.

Circle No. 148 on Reader Service Card.

it's almost magic...



...THE LEWIS "UNIVERSAL" AUTOMATIC WELDING FIXTURE

Difficult precision welds are made with robot-like regularity . . . with a LEWIS "Universal". This fully-adjustable fixture reduces the time, sweat and high costs normally associated with large weldments . . . and does it so easily it's almost magic!

Exclusive "Universal" features include portability . . . simultaneous 3-directional operation . . . remote pushbutton control . . . use of any standard head for welding, flame cutting or hardening . . . fast set-up and easy operation by one man.

But these are only a few outstanding LEWIS "Universal" advantages. For complete details and prices, write today or call BEdford 2-2500.

LEWIS **THE LEWIS WELDING & ENGINEERING CORP.**
70 Interstate Street • Bedford, Ohio
6711-LW

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GLASS . . . HELMET OR GOGGLE COVER LENSES

PLAIN or PLASTIC COATED

NOW AVAILABLE IN . . .

HANCY WALL DISPENSER

NO EXTRA COST

- 100 per dispenser
- Finest quality
- Lowest prices

IMMEDIATE DELIVERY

For Direct Sale only to Qualified Welding Supply Distributors.

ARM-R-CLAD LENSES

WRITE FOR DETAILS AND PRICES

Manufactured By

HORDIS BROTHERS

5617-25 HEGERMAN STREET

PHILADELPHIA 24, PA.

Twin Hose Reel

United Specialty Corp. announces listing by Underwriter's Laboratories, Inc., of their Model OA twin hose reel. This Weldreel model eliminates most of the hazards of welding hose on the floor and extends hose life. Unit handles up to 50 feet of 3/16-inch dual welding hose and lesser lengths of 1/4-inch or 5/16-inch dual welding hose.

Unit has chevron-type seals in rotating swivels that are leakproof in tests up to 600 psi after 50,000 cycles of operation. A smooth roller feeding action alloy hose to pay out freely and lock automatically at any desired length. Slight tug releases locking pawl and retracts hose onto reel.

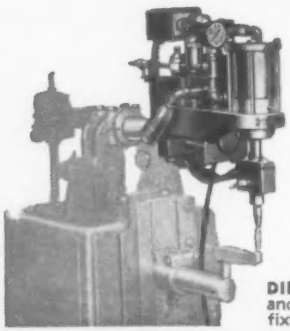
Two universal-type brackets attach reel to ceiling, wall, floor or welding cart.

Circle No. 86 on Reader Service Card.

Cast Iron Brazing Flux

A new cast iron brazing flux has been introduced by American Solder and Flux Co. When used with either a bronze or cast iron rod, new AMCO 4418 is said to bring rod to the liquid point in shortest possible time. This new flux also wets metal with ease and permits brazing metal to flow into smallest cavity. It also permits brazing metal to amalgamate with base metal to form a perfect chemical bond.

Circle No. 149 on Reader Service Card.



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at HOFFMAN-CHICAGO

Spot, Butt, Seam, Gun, Flash, Projection, Multi-Point and Stud Welders

NEW • USED • REBUILT

← WELD-AIR-MATIC
Spot welder air conversion unit. Tests prove 10,000 welds hourly on continuous daily schedules.

BUTT-ON-SPOT →
Automatic butt welding attachment. Water - cooled, fits any spot welder with minimum horn clearance of 7".

DIES: complete facilities to design and build special welding dies and fixtures for your piece parts.

ACCESSORIES: complete stock of Welder Controls, Holders, Tips, and Bar Stock.

Write for our current available Welder List

ROBT. W. HOFFMAN CO., INC. **38 South Clinton Street, Chicago 6, Illinois**

Circle No. 41 on Reader Service Card.

hear about . . .

the new **miller** MULTI ARC *combination ac-dc welders?*

SRAC ac-dc WELDERS

. . . get metallic arc welding jobs done in a superior, time saving way because:

- Operator selects instantly, (1) ac, (2) dc straight polarity or, (3) dc reverse polarity. Here's versatility.
- Patented UNITRAN control circuit eliminates mechanical controls. Here's efficiency.
- No moving parts, plus excellent electrical qualities reduce maintenance and operating costs. Here's savings.

Available in 200, 300, or 400 ampere models with ratings at 60% duty cycle. Power Factor Correction can be supplied.

SRTA ac-dc WELDERS

. . . for BOTH inert gas and metallic arc welding. Instant change from ac to either straight or reverse polarity dc. Power Factor Correction on all models. UNITRAN control circuit removes need for mechanical control and delivers outstanding uniformity throughout welding range. Built in high frequency, combined with balancing resistor, which is in series with transformer secondary, make this the welder for inert gas and metallic welding. Available in 200 and 300 ampere models, rated at 60% duty cycle.

". . . if it's MILLER you know it's the finest . . ."

Distributed in Canada by
Canadian Liquid Air Co., Ltd.,
Montreal, P.Q.

miller
ELECTRIC MANUFACTURING CO., INC.
APPLETON, WISCONSIN

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Circle No. 21 on Reader Service Card.

"FLUX-WELL"

Welding Fluxes

No. 1—WELDING FLUX
For Cast or Malleable Iron

No. 2—BRAZING COMPOUND
For Brass, Bronze, Steel Brazing

No. 4—ALUMINUM FLUX
For Cast or Sheet Aluminum

No. 5—BRAZING COMPOUND
For Cast or Malleable Iron

Write for Free Folder!

Weld Rod Division

THE CHICAGO HARDWARE FOUNDRY CO.

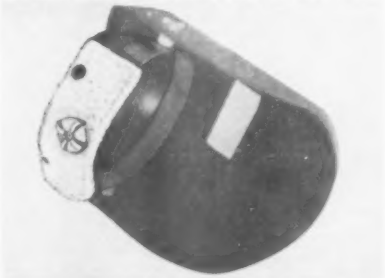
NORTH CHICAGO, ILL.

Hardfacing Foundation

An advanced foundation material for building up carbon steel parts preliminary to hard facing is now available in a low-cost build-up electrode from All-State Welding Alloys Co., Inc. The new electrode is alloyed to resist plastic deformation, upset and over-roll even under severest working conditions and is effective in eliminated spalling of expensive overlay alloys.

The Roll Matrix electrode is inherently wear-resistant, but is not classed as a hardsurfacing rod. It is intended to be overlayed with a harder alloy. Electrode comes in 1/8, 5/32, 3/16 and 1/4-inch core diameters.

Circle No. 151 on Reader Service Card.



Head Gear Pad

A new style head gear pad introduced by John Tillman & Company is made from high grade sheeps wool with snap fasteners for easy application. Called Head Gear Pad No. 561, it is designed for the ratchet section of all makes of head gear using this adjustable feature.

Company's regular No. 560 pad fits all other types of gear.

Circle No. 150 on Reader Service Card.

for a firm grip . . . demand Allied BULLDOG

TRACTOR GROUSER RETREAD

- EXCLUSIVE DESIGN
- INCREASED TRACTION
- RE-LUG WITHOUT DISMANTLING
- WORK-HARDENING STEEL
- SCIENTIFICALLY "WELD-METALIZED"
- ANY SIZE OR SHAPE

Also . . . Steel Plate, Grader Blades, Special Cutting Edges, Pneumatic Tools, Traffic Signs and Sign Posts, Gutter Broom Wire and Fibre Brooms.

Territory open for agents and dealers.

ALLIED STEEL & TRACTOR PRODUCTS INC.

7835 Broadway • Cleveland 5, Ohio • U.S.A.

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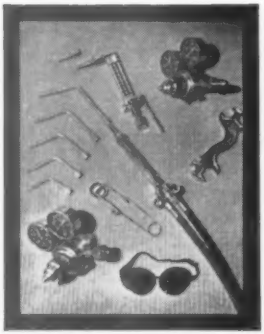

are you as yet a smaller welding equipment and supply distributor.

and would you like to grow into a big one more rapidly? ● ● ●

If you consider yourself a growing, aggressive, ambitious distributor in the welding industry, our old established company has a great deal to offer you.

We have been in the welding and the welding equipment business for over 44 years. We believe that those who have sold or purchased NATIONAL welding and cutting torches, regulators, cylinder manifolds and all of the other items we produce, found them good. Found them, beyond doubt, the VERY FINEST money may purchase.

And, what is more important from your point of view, this apparatus is so carefully designed and so well built, that neither you nor your customer will need to spend costly time and vexing hours on frequent repair service and undesirable "shut downs". And, neither you nor your customer will need to invest as heavily in repair parts and in innumerable varieties of models and types. Yet . . . our line is as versatile, as complete, as all-embracing as is any other. But . . . we have taken great care to do our own experimenting rather than impose this thankless and costly task upon our distributors and their precious customers.

We have very much to offer, both to you and to your prospects and customers, and we most cordially invite you to communicate with us BEFORE YOUR TERRITORY WILL BE SPOKEN FOR.

● National of ...california ●

we will welcome your inquiry and supply you with full information and printed matter upon request

---

545H DEPT.

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

Circle No. 66 on Reader Service Card.

How high metal deposition rates, heavy, convex bead shapes and sound welds with superior physical properties can be obtained in fabrication of magnesium plate and sheet is explained in the second part of this discussion of new developments in semi-automatic . . .

Consumable Electrode Inert Arc Welding of Magnesium | *Conclusion*

by PAUL KLAIN
Metallurgical Laboratories
The Dow Chemical Co.

Range of settings suitable for welding the various plate thicknesses with .050, .064 and .092-inch diameter J1 wires under spray transfer conditions are summarized in Table III.

Welding speeds were in the range of 24-36 ipm. With .050 wire, welding $\frac{3}{16}$ to $\frac{3}{8}$-inch plate was possible under conditions shown. But, because wire speeds were extremely high and at the top of the range of equipment, the use of .050-inch wire did not appear to be too well suited for general use, especially since other wires at slower speeds could be used on most of the thicknesses considered. However, the .050 wire was superior for vertical down and horizontal

Welding Conditions for Different Plate Thicknesses with Spray Transfer Arcs in Argon with J1 Wire on FS1 Plate

WIRE DIAM. IN.	PLATE THICKNESS IN.	ARC VOLTS	ARC AMPS	WIRE SPEED I.P.M.	WELDING SPEED I.P.M.	TYPE OF WELD
.050	3/16-3/8	24-30	220-280	788-960	24-36	Butt and Fillet
.050	1/4	22-24	220-230	830-913	"	Vertical Down Fillet
.050	1/2	24-26	220-230	913	"	Vertical Down Fillet
.064	1/4	24-30	240-290	550-660		Butt and Fillet
.064	3/8	24-30	260-350	560-745	"	Butt and Fillet
.064	1/2	24-30	320-390	740-820	"	Butt and Fillet
.092	3/8	24-30	330-350	350-385	"	Butt and Fillet
.092	1/2	24-30	350-380	360-402	"	Butt and Fillet
.092	3/8	26-30	370-420	375-417	"	Butt and Fillet
.092	1	26-30	370-420	375-417	"	Butt

Welding Conditions and Properties of FS1 Welded Plate. Square Butt Joints, J1 Wire, Argon Shield.

THICKNESS IN.	NO. PASSES	GAP	BACK UP	ARC AMPS	ARC VOLTS	WIRE DIAM. IN.	WIRE SPEED I.P.M.	AVERAGE WELD STRENGTH 1000psi	AVERAGE %E	AVERAGE %EFF.
3/16	1		Groove	215	24	.051	830	36.8	6.6	
3/16	1		Groove	220	25	.051	870	38.5	7.8	
3/16	1		Shim	230	25	.051	830	40.1	8.8	
1/4	1	None	Shim	320	25	.098	316	35.1	8.8	
3/8	2	None	None	370	5	.098	343	33.0	6.0	
3/8	2	1/16	None	320	24	.098	316	36.6	13.4	
3/8	2	3/32	None	320	25	.098	316	33.9	7.1	
1/2	2	None	None	380	25	.098	355 343	36.1	17.5	98.3
1/2	2	1/16	None	360 370	24.5 25	.098	343	36.3	17.4	98.9
1/2	2	3/32	None	370	25	.098	343	36.2	17.6	98.6
PROPERTIES OF 1/2" FSI-O PLATE								36.7	21.3	

positions for the 1/4 to 1/2-inch plate under the conditions shown. The .064 and .092 wires were not satisfactory for position welding because the weld metal in the puddle tended to roll down. As was evident, considerable overlapping in plate thicknesses, which could be welded by each wire, existed. The best welding conditions for all wires were obtained when arc voltage was in the range of 24-30 volts, with preference for the higher end of the range on materials over 1/2-inch thick.

From the data in the table, it would appear that .064 and .092 diameter wires would cover most of the range of thicknesses which could be welded by spray transfer

Welding Conditions for Thin Sheet with Low Voltage Drip Transfer in Argon Arcs

WIRE DIAM. IN.	SHEET THICKNESS IN.	ARC VOLTS	ARC AMPS	WIRE SPEED I.P.M.	WELDING SPEED I.P.M.	TYPE OF WELD
.027	.025	13-18	16-25	205-263	24-36	Butt
.027	.032	13-18	25-30	300-320	24-36	Butt
.027	.040	13-18	30-35	340-420	24-36	Butt
.027	.050	13-18	35-40	430-510	24-36	Butt
.050	.040-.093	13-18	32-80	125-290	24-36	Butt
.064	.040-.093	13-18	40-130	100-205	24-36	Butt
.092	.064-.125	13-18	50-130	70-144	24-36	Butt

Properties of Thin Sheet Welds Made with Consumable and Tungsten Electrode Arcs in Argon Gas (FS1-O Sheet, J1 Wire.)

THICKNESS IN.	WIRE DIAM. IN.	AS-WELDED AVERAGE WELD STRENGTH PSI	AS-WELDED AVERAGE % ELONG.	AS-WELDED AVERAGE % EFF.	GROUND FLUSH AVERAGE WELD STRENGTH PSI	GROUND FLUSH AVERAGE % ELONG.	GROUND FLUSH AVERAGE % EFF.
.032	.050	33.7	8.3	92.7			
.040	.050	35.8	7.0	95.5			
.050	.050	35.5	8.3	94.6	35.2	6.7	93.8
.064	.050	35.7	10.6	99.5	35.7	10.8	99.5
.040	.064	36.3	9.3	96.8	35.8	4.0	95.4
		TUNGSTEN ARC WELDS					
.032	1/16	32.6	6.7	89.6			
.040	1/16	34.1	6.0	91.0			
.050	1/16	35.5	8.7	94.7	34.6	8.6	92.5

arcs in the flat position.

Welding conditions and properties of square butt joints in 3/16, 1/4, 3/8 and 1/2-inch plate are summarized in Table IV. The results showed good welds strengths with efficiencies of 90 percent or better, based on 36,700 psi tensile strength of the original plate in thicknesses of 1/4 to 1/2-inch. The 3/16-inch plate was in the hard rolled condition originally and its properties and efficiency were different.

Soundness and Appearance of Welds

Welds produced by spray transfer arcs have been radiographed and found to be as sound as tungsten arc welds. There was no porosity problem as had been experienced with aluminum welds. The only defects noticed have been those caused by oxide inclusions due to agitation of the weld puddle as a result of too low arc voltage or too high current. Either condition resulted in entrapment of oxide skins, appearing as cold shuts.

The good welds had smooth, slightly rippled surfaces. Poor looking beads resulted from turbulence in the weld puddle caused by excessive current density. Contours tended to be convex rather than concave because of the high wire deposition rates. Welds made with currents in excess of 300 am-

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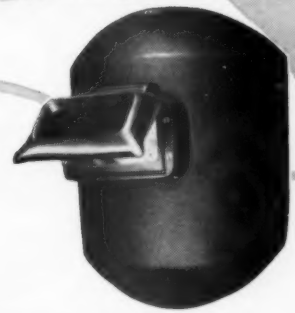

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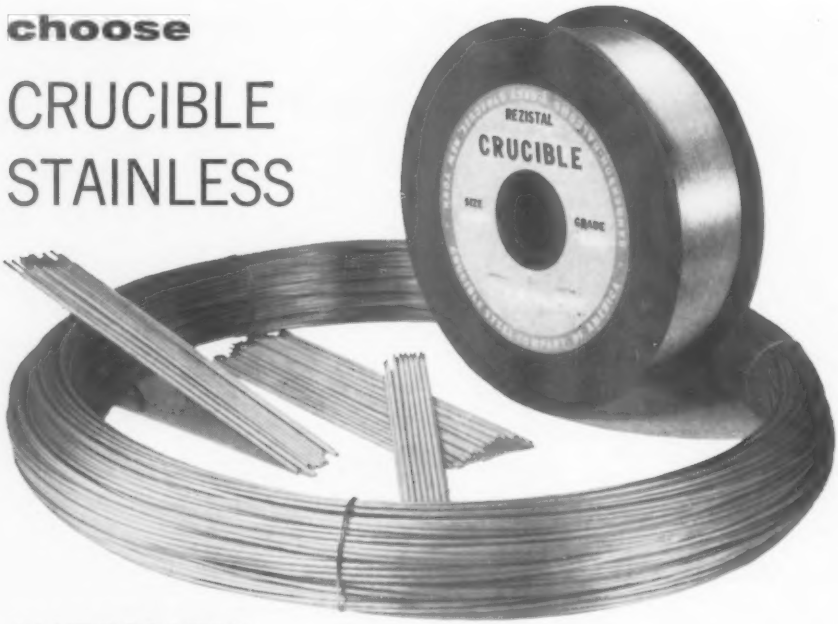

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peres were not completely sound because of turbulence, and the contours were more irregular, although penetration was deep.

Cross sections of square butt joints in $\frac{3}{16}$, $\frac{3}{8}$ and $\frac{1}{2}$-inch plate and vertical down and fillet welds in $\frac{3}{16}$, $\frac{1}{4}$ and $\frac{1}{2}$-inch plate were examined.

The butt joints show the high build-up of bead obtained and indicate the necessity for beveling the edges on materials thicker than $\frac{1}{4}$-inch. Vertical down fillet welds show good penetration and a concave bead shape.

Welding Thin Sheets

As has been indicated in previous discussions, spray transfer arcs were not suitable for welding thin gauge materials. Investigations of globular transfer conditions at normal arc voltages also showed unsuitability because of melting through before the globule dropped off the end of the wire. However, investigation of conditions at lower arc voltages resulted in a metal transfer intermediate between globular and spray, designed as low voltage drip.

The tip of the wire formed a small globule which dropped off rapidly into the puddle. The formation and dropping off of this globule was extremely rapid and it was difficult to follow visually. The low voltage drip took place at 13 to 18 arc volts, in both argon and helium. However, due to stubbing, helium was not satisfactory.

If the voltage range were exceeded, slow globular deposition occurred, while if diminished below the range, stubbing of wire resulted. This type of metal transfer has permitted satisfactory welding of sheet materials from .025 to .125-inch in thickness. Conditions for welding various sheet thickness with different wire sizes are listed in Table V. Welding speeds were the same as for spray metal arc, ranging from 24 to 36 ipm.

Tensile properties of low voltage drip transfer welds were compared with some values for tungsten arc welds. These showed no significant differences in properties of welds made by the two different methods.

On the basis of tests to date, flat, horizontal and vertical down welds could be easily made by the low voltage drip arc. Welding speeds remained about the same as for the spray transfer arc, ranging from 24 to 35 ipm. Because of the type of material being welded, conditions were naturally more critical. However, though manual and automatic welding was possible, indications were that best results would be obtained with automatic or semi-automatic welding with the drip transfer arcs.

Summary

To weld magnesium in all thicknesses, two types of arc are necessary: a high current density spray and a low current density, low voltage drip metal transfer. The spray type is best for material $\frac{3}{16}$-inch or thicker while the drip-type is for thicknesses below $\frac{1}{8}$-inch.

Best welding conditions are obtained with argon gas and mixtures or argon and helium. Helium by itself is unsatisfactory because of metal spatter and turbulence.

Welding speeds should be in the range of 24 to 36 ipm.

The consumable electrode process results in high metal deposi-

tion rates, producing heavy, convex bead shapes and sound welds with properties equal to tungsten arc welds.

One aspect of this investigation was the appraisal of the suitability of the newly developed constant potential power supplies. Results indicated satisfactory performance with all types was possible. From the practical viewpoint, there was no outstanding difference, although theoretically, best performance could be expected from a power supply which could match the volt-ampere characteristic of the metal in question. Other aspect of this investigation was concerned with arc characteristics and the establishment of practical conditions required for welding magnesium with constant potential power sources.

The chief advantage of the consumable electrode process has been shown to be high welding speeds, which can be from two to four times those of the tungsten arc. Essentially, consumable electrode welding is a semi-automatic process, since once welding conditions are set, operator cannot control the arc except by manipulation of controls for specific variables. Therefore, lower skilled labor than is required in conventional welding may be used.

In comparison with tungsten arc, the consumable electrode process lacks flexibility for general, all-purpose use, and consequently it may supplement tungsten arc but cannot replace it at this stage of development.

Where Process Is Used

The new process is expected to find its greatest usefulness in applications requiring large scale

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repetitious welding both manually and automatically. The spray metal transfer arcs are expected to be especially well suited for welding of heavy plates and sections, particularly when ½-inch thicknesses are exceeded, because of high deposition rates. The low voltage drip transfer arcs for thin sheet welding may find usefulness primarily as an automatic welding method because of the somewhat critical operating factors involved in its use.

Conditions and Limitations

Conditions and limitations of the consumable electrode process have been presented with the thought of stimulating interest and of enabling the potential user of magnesium to arrive at an intelligent appraisal of this new process.

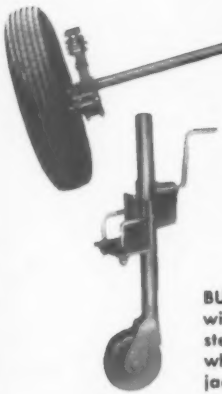
Wichita Plant to Make Woerner Profile Cutter

I. A. Woerner has licensed the manufacture and distribution of the Woerner Tubular Profile Cutting machine to the Nickelson Tool & Die Co., Inc., Wichita, Kansas.

The Nickelson organization has already commenced production of standard models after an extensive period of tooling and field testing.

Library Group to Hold Convention

The Metals Division, Special Libraries Association will hold their annual convention this year at the Hotel William Penn, Pittsburgh, Pa., June 4-7. Many papers will be presented relating to the metal industry. Field trips to plants in the Pittsburgh area are included on the itinerary.



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Clarence McL. Pitts

Pitts Heads I. A. A. for 1956-1957

Clarence MacLeod Pitts, prominent Canadian industrialist, was elected president of the International Acetylene Association at that group's annual convention.

Much of the success of the recent convention was attributed to the skill, industry and guidance of Mr. Pitts, past vice president, who served as presiding officer.

Mr. Pitts is president of People's Gas Supply Co., Ltd., Ottawa, Ontario, a firm which manufactures and distributes compressed gases and supplies for use in welding and cutting and allied processes. Incorporated in 1902, the company is one of the oldest companies in America to continuously engage in the acetylene gas business.

Mr. Pitts is also head of Pitts Construction Co., Ltd., and the Canadian-American Exporters, Ltd.

Active in religious, political, charitable and fraternal organizations, Mr. Pitts is a past president of the Compressed Gas Manufacturers' Association, Inc., and past chairman of the Canadian Section, Compressed Gas Association. He is also a member of the Association of Professional Engineers for Ontario, the Canadian Manufacturers' Association and a past chairman of the Ottawa Branch of the Engineering Institute of Canada.

Mr. Pitts graduated from McGill University, Montreal, in 1914, with the degree of Bachelor of Science in Civil Engineering. He practiced his profession throughout Canada until he joined the Canadian Army in World War I.

Upon his discharge he joined his father and brother in the operation of the firms he now heads.

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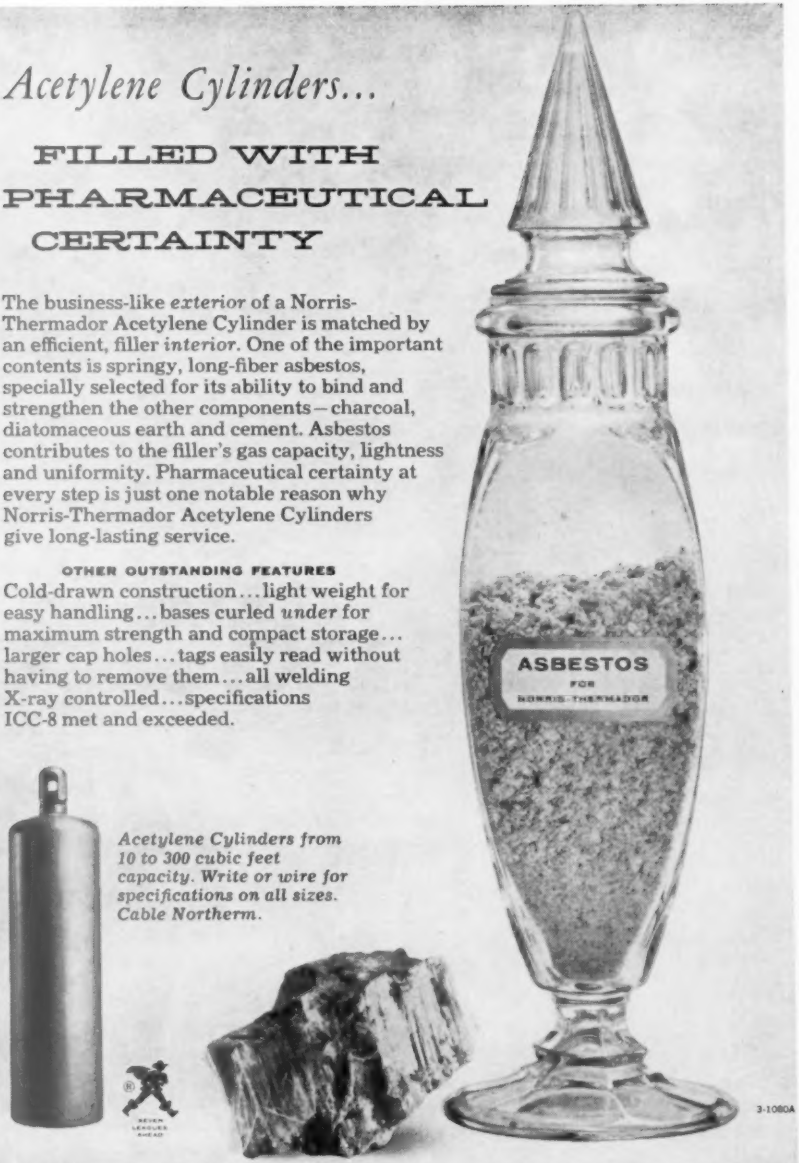

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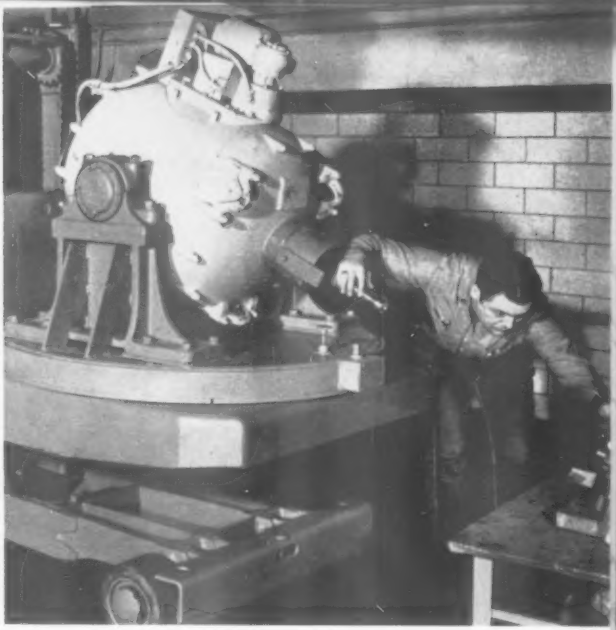
A new inspection tool, which uses radioactive Cobalt 60, requires a minimum of exposure time and makes it possible to . . .



Radiograph 7-Inch Thick Weldments

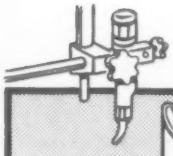
A NEW inspection tool which makes use of radioactive Cobalt 60 and is capable of radiographing —or "seeing through"—thickness of steel up to seven inches, has been developed by The Babcock & Wilcox Company. The unit has been christened the "Isoscope" a derivation of the words "isotope," a radioactive material, and "scope" for the power to see through metals. The "Isoscope" is said to require only one-third the exposure time of a million volt X-ray unit.

The lead sphere of the "Isoscope" is encased in a steel jacket having a cylindrical rotor section built into it. By revolving the rotor 180° the radioactive source can be brought from the "safe" position to a point in line with the coned opening in the steel jacket allowing a beam of radiation to escape. This, in effect, results in a unit which can be turned "on" and "off," according to the announcement.

The total charge placed in this unit was 1008 curies of Cobalt 60. The charge is comprised of small discs stacked one on top of the other like coins in a coin changer. The radiation is taken from the top of this stack so that the focal spot size compares favorably with existing high voltage X-ray equipment.

The balance of the "Isoscope" consists of a modified electric platform lift truck having a "lead cab" built on the back and a "turn-

(Continued on Page 125)



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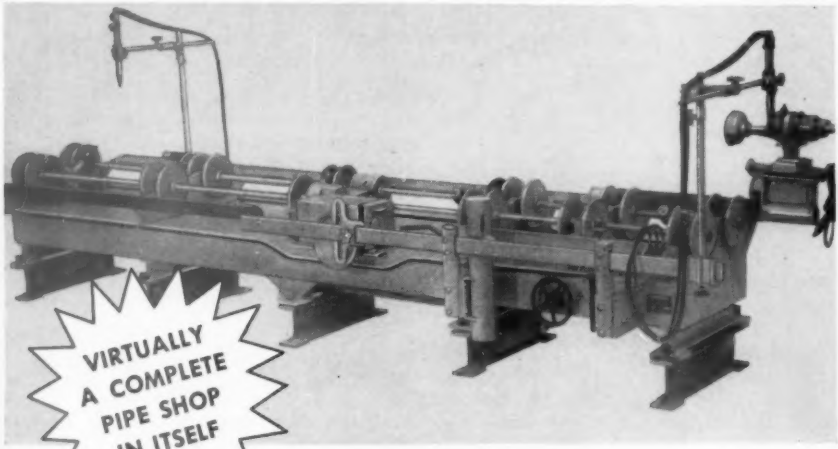

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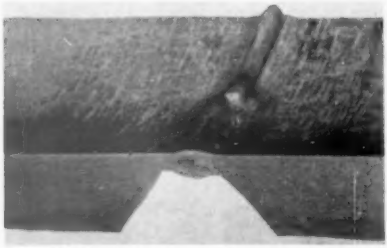
New consumable solid insert rings increase efficiency of inert arc welding of piping without backing rings. Here's . . .



Solid consumable insert ring (top) is positioned in pipe joint with positioner pins eccentric to center line of pipe. Partially welded top and bottom sections (below) show appearance of pipe weld up to solid consumable insert ring. At top of pipe, ring protrudes upward into bevel. At bottom of pipe, ring protrudes into the inside of pipe.

Another "Assist" for Welding Pipe

INERT-GAS tungsten-arc welding of piping without backing rings, smoother root pass welds with elimination of root pass cracking and improved weld contours in thin wall piping with one or two less passes are some of the benefits claimed for a new line of consumable solid insert rings.

On piping of wall thickness over ¼-inch, the welding insert ring is said to assist in obtaining root pass welds of uniform and smooth contours, free of crater and centerline cracks. Complete root pass weld provides an effective back-up for the subsequent shielded metal arc welding with covered electrodes.

Ideal for Thin-Wall Piping

On thin-wall piping, as Schedule 5 and 10 stainless steel, the welding insert is said to improve weld contour. On many sizes, the insert ring also eliminates the need for separately supplied filler metal and the necessity for one or two additional weld passes. This reduces welding costs.

On many stainless steel grades, the elimination of a second or third weld pass improves the resistance to intergranular corrosion in the heat-affected zone of the weld.

The consumable solid insert

rings are produced by Industrial Piping Division, Grinnell Co., Inc., for all standard or special pipe and tube sizes of diameters 1½-inches or larger.

Insert ring materials commonly available are mild steel; alloy steels 1¼ chrome — ½ moly, 2¼ chrome — 1 moly, 5 chrome — ½ moly; stainless steel Types 304 304 ELC, 310, 316 ELC, 347 (A) (fully austentic) and 347 (F) (4-6 percent ferrite).

For more information on this new development, write the Editor, INDUSTRY & WELDING Magazine, or circle No. 201 on Reader Service Card.

Change of Address—NCG

Purchasing personnel and all purchasing functions of the National Cylinder Gas Company, 840 North Michigan, Chicago, Illinois, have been moved from the downtown office to the plant location at 4700 West 19th Street, Chicago 50, Ill. It is expected that the move will result in better co-ordination of all buying functions.

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NEWS

from page 30

Alpha Tank Announces Latest Appointment

Milton Forman has been appointed vice president of Alpha Tank Company Inc., according to a recent announcement.

Formerly, Mr. Forman was employed as welding and metallurgical engineeer of Todd Shipyard, National Supply, and Ingalls Shipbuilding Corp. He is active on a number of committees including the Structural Steel Committee of the Welding Research Council, and the Welded Bridge Conference of the A.W.S.

Bay State Appoints Yochum

Robert J. Yochum has recently been appointed an abrasive engineer by the Bay State Abrasive Products Company of Westboro, Mass.

Mr. Yochum spent the past six years in the Engineering Department of the St. Louis Shipbuilding and Steel Company. He has also completed a training course given at Bay State's plant in Westboro, and has also received field training.

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Circle No. 86 on Reader Service Card.

New Titanium Welding Wire Producer

Newest entry in the new and rapidly expanding field of titanium is the Johnston and Funk Titanium Corp., Wooster, Ohio, organized recently by James H. Johnston and Edward R. Funk, who have had extensive experience in melting and fabricating the metal. The new firm is now in production of specialty titanium wire for use in welding.

Plant manager of the new titanium firm is Bufford R. Riffee.

Willson Products Division: A Progress Report

Willson Products, Inc. has been operated during the past twelve months as a wholly owned subsidiary of Ray-O-Vac Company. After the merger recently, Willson Products, Inc. ceased to exist as a separate corporation and will henceforth be known as Willson Products Division, Ray-O-Vac Company. The three officers of the division will be: J. C. Ryan, president; T. A. Willson, Sr., vice president research and production; and William C. Weeks, vice president for sales.

Circle No. 2 on Reader Service Card.

It is reported that the first year of operations of the Willson Products Division has exceeded expectations.

Wall Colmonoy Appoints W. Coast Representative

Appointment of Krist Leovitch, Jr. as sales engineer for the company's west coast sales office has been announced by the Wall Colmonoy Corporation, Detroit, Mich.

In his new position as Colmonoy representative, Mr. Leovich will be responsible for application engineering, development and service to users of hardfacing products in California. He was formerly employed by Aerojet-General Corp., where his duties included research work in welding and brazing.

United Specialty Appoints Weatherford

Hugh O. Weatherford has recently been appointed as factory representative by the United Specialty Corporation, El Dorado, Arkansas. Mr. Weatherford will primarily work with various distributor's sales personnel in the Southern states in introducing new products.

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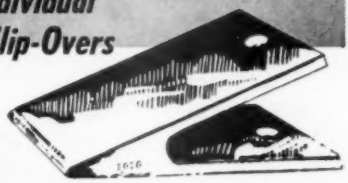

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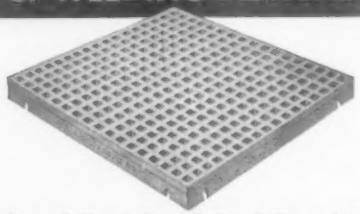

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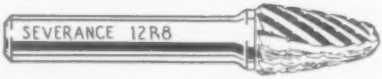

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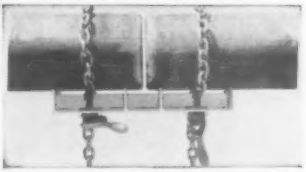

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Southern Alloy Clinic and Open House

The modern way to weld was demonstrated at a recent clinic and open house organized by officials of Southern Alloy Steel Corporation, Tampa, Florida.

The firm has operated in Tampa for about a year. I. Erdman, president of the corporation, optimistic about the future, commented "We're enjoying a successful start. We have bought a large tract of real estate . . . with more than 250 feet of railroad siding so we may be equipped to better serve our increasing number of customers."

The clinic and open house was attended by more than 400 people, said to represent many top officials of the welding industry in the Tampa area. One of the suppliers, Harnischfeger Corporation, assembled a large display of its products for the clinic. Ben Temple, Harnischfeger district manager, made the arrangements for this display. Much of the success of the open house is attributed to Al Wagner, manager, and Roy Massey, sales manager for Southern Alloy Steel, who gave much time and effort to the undertaking.

IWDA Will Hold Annual Meeting In San Diego

The Annual Meeting of the Independent Welding Distributors Association, Inc. will be held on June 21-22 in San Diego, Calif. Program will center around conferences and talks keyed to new business for the coming year. New officers will be elected as well.

RADIOGRAPHY . . .

(Continued from Page 116)

table" mounted on the front platform. Trunnions on the turn-table receive the lead ball containing the radioactive material. Cover plates mounted on top and bottom of the lead balls carry the cylindrical rotating mechanism. This assembled unit can be raised or lowered through 8 feet, rotated vertically through 210 degrees and horizontally through 360 degrees.

The lead cab provides protection for the operator and contains controls for the operation of the machine. The controls consist of a timer, an "on"-"off" button and a green, amber, and red light system which informs the operator of the position of his source at all times.

Advantages of this unit are said to be lower initial cost, less amount of shielding necessary for secondary radiation, greater mobility, known maintenance and operating costs, manual operation during mechanical breakdown and simplicity of controls.

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No. 5 Aluminum Flux for Cast Aluminum.
No. 8 Aluminum Flux for Sheet Aluminum.
No. 9 Stainless Steel Welding Flux.
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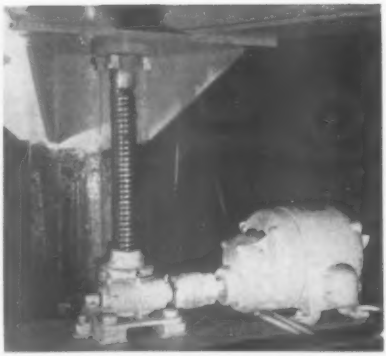

Use Worm Gear Jacks In Positioners

Worthington Corporation of Plainfield, N.J., has re-designed its entire line of pedestal type welding positioners to incorporate Duff-Norton worm gear jacks for elevation of the frames.

The result is more accurate elevation at substantially reduced production costs. One jack, powered by an electric motor, can lift as much as 50 tons 8 inches in 60 seconds at the touch of a push button.

Product Engineer Arthur Berlin of Worthington says use of the worm gear jacks, made by Duff-Norton Company of Pittsburgh, has two major advantages over hydraulics: 1) the self-locking worm gear jack eliminates any possibility of slipping or creeping under load as is the case in oil leakages when using hydraulics and 2) lower initial cost.

Worthington only slightly modifies Duff-Norton jacks in order to build them into four models of welding positioners as integral parts of the machines. The jacks range in capacity from five to 50 tons, depending on the model in which they will be used. Raise varies 8 to 30 inches.

For more information on this new development, write the Editor, INDUSTRY & WELDING Magazine, or circle No. 202 on Reader Service Card.

Santa Clara Valley A.W.S. Show A Great Success

Hundreds of welding industry people attended the first Santa Clara Valley A.W.S. Welding Show and Clinic in San Jose, California, on Friday and Saturday, April 27-28. The big show, co-sponsored by the Santa Clara Valley Section of the American Welding Society and the Engineering Department, San Jose State College, was held in a new and most modern engineering building at the college.

Over thirty manufacturers had equipment on display at the show. One of the unique features of the exhibition was the arrangement of the displays among the many large installations of engineering laboratory equipment. It gave the show a factory-like environment, and added authenticity to many of the demonstrations and clinics. In addition, an interesting display of welded products was arranged.

Exhibitors included American Platinum, Air Reduction, Arcair, Alcoa, All-State, Birdsell, Buck Mfg., Harnischfeger, Hobart, Inco, Jackson, Lincoln, Linde, M&T, Miller, N.C.G., National Welding, Sellstrom, Stoody, Stuart, Tillman, Tweco, Vacu-Blast, Victor, Magnaflux, Contour Marker, Kedman, and local distributors representing these and other firms.

Tillman Announces Expansion Program

An extensive expansion program for John Tillman & Co., Long Beach, Calif., manufacturers of leather supplies for the welding industry, has beeen announced by C. L. Breese, president.

Included in the expansion program is a plant addition which gives more space for manufacturing and warehousing and houses new executive offices and reception office.

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